Article

Revolutionizing Taxation: Tax Administration 3.0 is already here.

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KEYWORDS:

Tax Administration 3.0, Digitalization, Data Analysis, Electronic Invoice, Artificial Intelligence

ABSTRACT:

Governments globally acknowledge the efficient and transparent tax collection for fostering citizen fairness. Tax Administration 3.0 means a phase marked by advanced data utilization and automation, encompassing Digital Identity, Taxpayer touchpoints, Data management and standards, Tax rule management, New skill sets, and Governance frameworks. This article delves into the pivotal elements of Tax Administration 3.0, highlighting the shift from manual Tax Administration 1.0 to a comprehensive, data-driven approach, emphasizing transparency and cooperation. Central to this transformation is the role of data, facilitating innovative practices like pre-filled tax declarations, data analytics, and predictive modelling to combat fraud and enhance tax system fairness. While digitalization promises improved efficiency and taxpayer engagement, it also necessitates vigilant data security and privacy management to maintain public trust.

PALABRAS CLAVES:

Administración Tributaria 3.0, Digitalización, Análisis de Datos, Factura Electrónica, Inteligencia Artificial

RESUMEN:

Los gobiernos a nivel global reconocen la necesidad de una recaudación de impuestos eficiente y transparente para fomentar la equidad entre los ciudadanos. La Administración Tributaria 3.0 representa una fase caracterizada por la utilización avanzada de datos y la automatización, abarcando la Identidad Digital, los Puntos de contacto con los contribuyentes, la Gestión de datos y estándares, la Gestión de reglas tributarias, Nuevas habilidades y Marcos de gobernanza. Este artículo profundiza en los elementos clave de la Administración Tributaria 3.0, resaltando el cambio desde la gestión manual de impuestos (Administración Tributaria 1.0) hacia un enfoque integral basado en datos, haciendo hincapié en la transparencia y la cooperación. En el centro de esta transformación está el papel de los datos, facilitando prácticas innovadoras como declaraciones de impuestos prellenadas, análisis de datos y modelado predictivo para combatir el fraude y mejorar la equidad en el sistema tributario. Aunque la digitalización promete una mayor eficiencia y participación de los contribuyentes, también requiere una gestión proactiva de la seguridad y privacidad de los datos para mantener la confianza pública..

MOTS CLÉS :

Administration fiscale 3.0, Numérisation, Analyse des Données, Facture Électronique, Intelligence Artificielle

RÉSUMÉ :

Les gouvernements du monde entier reconnaissent la nécessité d'une collecte de taxes efficace et transparente pour favoriser l'équité entre les citoyens. L'Administration fiscale 3.0 représente une phase caractérisée par une utilisation avancée des données et l'automatisation, englobant l'identité numérique, les points de contact avec les contribuables, la gestion des données et des normes, la gestion des règles fiscales, les nouvelles compétences et les cadres de gouvernance. Cet article explore les éléments clés de l'Administration fiscale 3.0, mettant en évidence le passage de l'administration manuelle des impôts (Administration fiscale 1.0) à une approche globale basée sur les données, en mettant l'accent sur la transparence et la coopération. Au cœur de cette transformation se trouve le rôle des données, facilitant des pratiques innovantes telles que les déclarations fiscales préremplies, l'analyse de données et la modélisation prédictive pour lutter contre la fraude et améliorer l'équité du système fiscal. Bien que la numérisation promette une efficacité accrue et une participation accrue des contribuables, elle nécessite également une gestion proactive de la sécurité et de la confidentialité des données pour maintenir la confiance du public.

Contents:

1 INTRODUCTION TO DIGITAL TAX ADMINISTRATION

Digitalisation has become a transformative force in the modern relationship between tax administration and taxpayers. This concept refers to using digital technologies to enhance tax collection processes' efficiency, transparency, and fairness. In an increasingly digital age, the significance of technology in tax systems cannot be overstated. We can define digital transformation as integrating digital technology into all areas of an organisation's business, resulting in fundamental changes in its operations and how it creates value. ("The Enterprisers Project")

Indeed, digitalisation is spearheading a transformation in Tax Administrations (TAs), leading to enhanced operational efficiency and service delivery (Gupta et al., 2017). Tax Administrations are encountering a series of significant challenges stemming from the rising population, evolving economic dynamics, the proliferation of small and medium-sized taxpayers, and the growing complexity of tax laws (Bellon et al., 2022). To navigate this evolving landscape, Tax Administrations must adapt and embrace the opportunities that digitalization presents, particularly in their efforts to fight against fraud and evasion and facilitate tax compliance. Furthermore, digitalization can improve transparency and citizens' trust in public institutions and governments.

In this context, tax administrations must leverage cutting-edge technologies to harness large volumes of data to enhance services for taxpayers and control processes and invest in simplifying compliance processes to make compliance control interventions more effective to increase tax collection and build citizens' trust in public institutions and governments.

The Government's recognition of the imperative of ensuring efficient and transparent tax collection, fostering a sense of fairness among their constituents, has driven the evolution towards Tax Administration 3.0, a more advanced stage of digitization, which mandates the capitalization of data and automation to refine the services and processes of tax administrations.

TA 3.0 identifies six core building blocks in digital transformation: Digital Identity, Taxpayer touchpoints, Data management and standards, Tax rule management and application, New skill sets, and Governance frameworks. This article is not intended to delve into all these core building blocks or on individual jurisdictions and their unique progress in digital transformation. Instead, it aims to explore some key areas crucial to Tax Administration 3.0 (TA 3.0) and the digital transformation journey. This exploration highlights the evolving trends in digital transformation within tax administrations, offering insights into the critical areas underpinning the TA 3.0 framework.

2 THE EVOLUTION OF TAX ADMINISTRATION: FROM 1.0 TO 3.0

As explained by the OECD, 2020, in the world of tax management, the concept of Tax Administration 3.0 marks a profound shift. Tax Administration 1.0, the initial era, was characterized by paper-based processes and manual, isolated operations. Tax authorities heavily relied on physical documents and grappled with disconnected data silos. As society

and the economy transitioned to the digital realm, Tax Administration 2.0, often known as "e-administration," took shape.

In Tax Administration 2.0, the advent of digital technologies presented new opportunities. Tax administrations embraced digital data and advanced analytical tools, moving beyond tax collection. They fostered collaborations with other government agencies, private sector entities, and international organizations, yielding substantial improvements in efficiency and effectiveness. Following this initial phase, Tax Administration 3.0 represents a natural evolution. Tax administrations fully harness digitalization, data integration, and advanced analytics in this phase. It means adopting a holistic, data-driven approach to tax management, enabling precise insights into business activities, streamlined processes, and innovative practices. Tax Administration 3.0 prioritizes transparency and fairness in taxation, enhancing the relationship between taxpayers and government entities and ultimately creating a more efficient, equitable, and cooperative tax ecosystem.

3 IMPORTANCE OF DATA

In Tax Administration 3.0, data is the lifeblood that fuels its transformation. Data is pivotal for many reasons, primarily because it empowers tax administrations to make informed decisions, enforce compliance, and ensure tax fairness. Data-driven tax administrations can better understand the intricate details of business activities, including financial transactions, investments, and contractual relationships. This understanding goes beyond mere tax collection and fosters a holistic approach to taxation, where authorities can assess what is owed and what is expected from businesses.

To facilitate a seamless transition toward cashless economies, imagine a scenario where a business purchases raw materials for processing and transformation into finished products for sale. The cashier terminal used by the business communicates transaction information in real time to the tax authority, establishing an immediate and comprehensive digital record. (McKinsey, 2020)

As the business proceeds to sell the manufactured products, the customer payment includes taxes calculated, collected, and informed to the tax administration in real time. The system creates an auditable trail through the real-time digital records of transactions Instead of relying on counterparties to report pairs of input VAT and output VAT. The Brazilian government envisages a system similar to this one as part of implementing their new dual VAT system, marking a significant step forward in modernizing tax collection and compliance mechanisms.

Moreover, the power of high-quality data enables the implementation of innovative practices, such as prefilled tax declarations, which streamline the process for taxpayers and tax authorities alike, making compliance a smoother and less burdensome task Jenkins et al. (2023). Data analytics and predictive modelling are also helping tax authorities identify tax evasion and fraud and reinforcing fairness in the tax system.

3.1 HOW ARE THE TAX ADMINISTRATIONS EMBRACING ANALYTICS?

Traditional tax data gathering has primarily focused on retrospective analysis, dealing with historical transaction data for business planning and compliance purposes. Such as counting on data collected from tax declarations filed by the taxpayer based on facts that occurred in the previous year. However, there is a growing need to transition from a mindset of "what do I need to do" to "what do I need to know." Tax administrations can harness the power of analytics to gain insights and even foresight into tax outcomes. Insight is derived by delving deeper into data through advanced queries, enabling a better understanding of the factors influencing tax outcomes. On the other hand, foresight can be

achieved by using historical data to create statistical models for projecting future tax scenarios. By embracing analytics, tax organizations can move beyond hindsight and proactively approach tax planning and risk management.

3.2 THE EVOLUTION OF TAX ANALYTICS: FROM DESCRIPTIVE TO PREDICTIVE AND PRESCRIPTIVE:

The use of analytics in tax administration has evolved from primarily descriptive dashboards in which analytics were employed to create descriptive scorecards and visually represent large volumes of data, primarily for retrospective analysis. The same happened with the standard reports generated by the tax management systems. These early use cases helped organizations identify resource allocation, anomalies in results, and potential risk areas. As tax organizations recognize the value of these initial projects, they are increasingly adopting analytics to gather a vision of the future called predictive analytics. It utilizes historical data to identify critical predictors for future tax scenarios, employing statistical models to forecast potential outcomes. Prescriptive analytics takes insights further by recommending actions based on identified opportunities and risks, enabling tax administrations to shape their tax strategies and decision-making proactively.

In this world of data, the digital collection of accounting information from companies plays a pivotal role in this transformation (Calijuri, M.S. et all., 2023) It empowers tax administrations to better understand business activities, encompassing operations, financing, investments, company performance, and contractual relationships. The quality of this data has profound implications for a company's profitability and tax obligations to the government.

One premise of Tax Administration 3.0 is to use the natural system of taxpayers. An example of what it means is the open-source application CACAO (Calijuri, M.S, Munoz, A., 2023), which is an integration of application programming interfaces (APIs). CACAO is a tool developed to gather accounting information from third parties (taxpayers) digitally interacting with tax administration systems without the TA providing direct access to those systems.

Additionally, high-quality data opens the door to more profound insights, enhancing the tax administration's ability to ensure that companies fulfil their tax obligations most efficiently. Furthermore, it facilitates improved service delivery by enabling new services, such as pre-filled declarations, simplifying the tax filing process for companies, reducing compliance costs, and increasing overall efficiency.

4 DIGITAL MATURITY INDEX

Acknowledging the varying stages of digitalization within tax administrations is paramount, as they operate within distinct legal and economic frameworks. Some tax administrations may lean towards concentrating their efforts on laying the groundwork for a seamless, digitally transformed tax system of the future and a focus on increasing a digital experience for the taxpayers, building better Taxpayer Portals or investing in reaching taxpayers via Application Programming Interfaces (API). Based on 52 jurisdictions, (OECD, 2023) found that most Tax Administrations participating in the research are now creating APIS, whether by themselves or with third-party developers (60%). Meanwhile, other TAs may have a strategy that places substantial value on intensifying the digitalization of their existing processes and service offerings without creating new ones.

In order to embrace digitalization, the recognition of these divergent approaches underscores the need for a comprehensive evaluation methodology such as the "Índice de Madurez Digital" (Digital Maturity Index or IMD) (Reys-Tagle G. et al., 2021a and Reys-Tagle G. et al., 2021b) which can accommodate these differences and guide tax authorities on their

digital transformation journeys. The IMD not only enables the evaluation of a specific TA's progress at a given point in time but also serves as a roadmap for tax collection authorities to advance in the digital transformation process for their respective TAs.

International organizations such as the Organization for Economic Cooperation and Development (OECD), the Intra-European Organization of Tax Administrations (IOTA), the Inter-American Center of Tax Administrations (CIAT), and the Inter-American Development Bank (IDB) have identified and documented best practices in utilizing technology and information processes for tax collection. These best practices are rooted in key principles, including entering data into the system only once (data-only-once), centralized data management for various products and services (single source of truth), digital data storage and transmission (paperless), and real-time data reception and processing.

Using these concepts, the IMD used by the Inter-American Development Bank elaborate a scale with four maturity levels: initial, intermediate, advanced, and best practices, characterizing the advancement of a given TA across critical dimensions related to data and information services for tax collection.

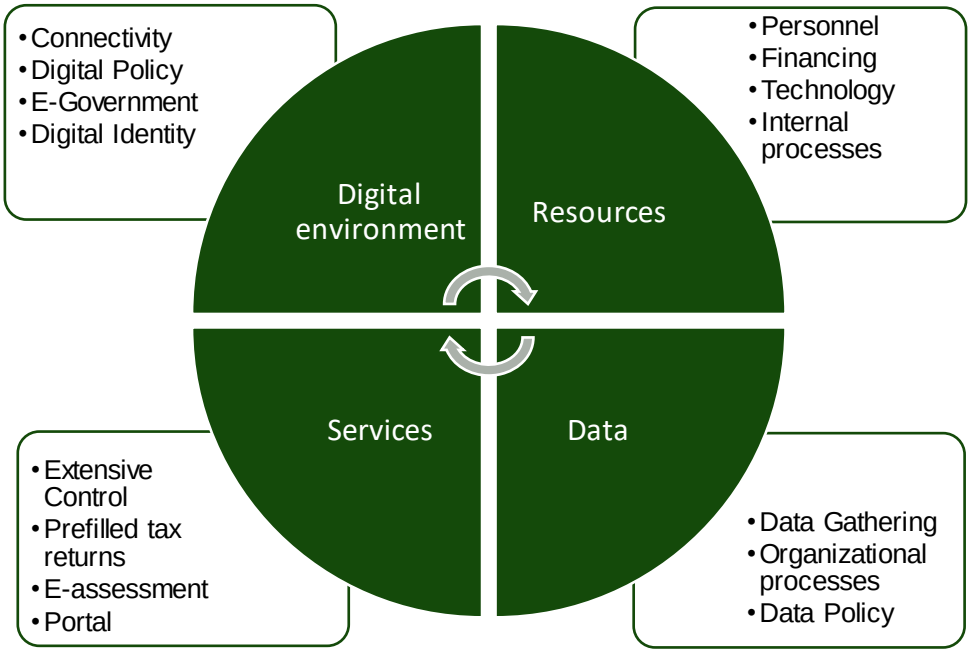

Figure 1. IMD – Dimensions. Source : Reys-Tagle et al. (2021b).

5 DIGITAL IDENTIFICATION

In this rapidly evolving digital landscape, digital identity[1] is a pivotal foundation for future seamless tax administration. Nevertheless, the fact that electronic individual identification and authentication systems are not mainly spread in developing countries restricts the digitalization of many services. It rose to monopolies among intermediary entities that provide trust between interacting parties (namely electronic signature). These services are mostly paid for by the taxpayers; sometimes, they are costly, which constitutes a barrier to expanding the use of Digital Identity for data protection and individual privacy.

It is worth saying that digital identity extends beyond merely establishing trust in remote connections; it is a prerequisite for the secure and trusted interactions vital for

[1] Digital identity is the digital representation of an entity with sufficient detail for individuals to distinguish themselves within a digital context." - ITU (EU-BDID, 2019). The European Union Blockchain Observatory and Forum. (2019).

modern taxation. It encompasses a spectrum of attributes and credentials that traverse personal and official processes, as well as various roles, such as individual taxpayers or business representatives.

Therefore, a digital identity framework is essential to facilitate the seamless integration of public and private systems with those employed by tax administrations and taxpayers. These connections can be human interactions, enabling individuals to access secure self-service portals or manifest through authorized automated machine-to-machine applications.

Table 1 shows that in 2022, 100% of the 52 TA jurisdictions participating already require individual taxpayers to use approved digital identity to access secure digital services, and 94% of business taxpayers are required to do so.

Taxpayer type	Taxpayers are required to use an approved digital identity (DI) to access secure digital services.	Tax administration	Another government body	Private sector body	Another government body	Private sector body
Individual	100	69	63	39	37	14
Business	94	67	50	35	47	9

Table 1 Use of digital identities, Source: OECD (2023) p. 154

In recent years, there has been a significant advancement in standards, protocols, and technologies aiming to introduce a new concept of identity that is accessible to all, cost-effective, secure, and scalable. This innovative model, known as self-sovereign digital identity (Allende, M., 2020), addresses the current challenges in personal identification and authentication while granting individuals full control over their digital persona. It incorporates two groundbreaking technological elements: digital wallets and decentralized information records.

This model allows individuals to have autonomy in managing their digital assets and credentials, such as digital passports, academic degrees, property titles, or tokenized currencies like dollars, euros, pounds, or pesos, using personal and portable digital wallets, often in the form of mobile applications. It also eliminates the need for a third party to directly verify the authenticity or validity of a digital asset, as verification can be done against a public and decentralized ledger, such as blockchain networks. This paradigm shift holds great potential in enhancing security, privacy, and user-controlled identity management.

Brazil has a growing initiative to leverage new digital payment and identification systems to incorporate a targeted social benefit dimension into reform strategies. This strategy aims to alleviate the Value Added Tax (VAT) burden for low-income households and beneficiaries of social transfers when making essential purchases. One innovative approach being considered involves the implementation of targeted transfers, "cashback." This approach capitalizes on a synergy of existing identification tools, such as the national registry of low-income households (CadÚnico), digital payment system, PIX, and Electronic Invoice.

In conclusion, digital identity management, which may also encompass national identities, is indispensable for the ongoing transformation and modernization of tax administration processes. Establishing robust and universally accepted digital identities is not just a matter of convenience but a fundamental necessity for modernizing tax systems, improving security, and ensuring efficient, trusted, and user-friendly interactions between taxpayers and tax authorities.

6 E-INVOICING AND DIGITAL RECORDS

E-invoicing and the maintenance of digital records are fundamental for accurate and fraud-resistant tax administration. These practices improve the precision of financial data and significantly reduce the risk of fraudulent activities.

Implementing electronic invoicing (e-invoicing), a system enabling the automated exchange of billing information between businesses and tax authorities (TAs), is a compelling example of digital transformation in tax administration. This approach to invoicing has gained traction in over 50 countries worldwide, with a significant presence in Latin America and the Caribbean (LAC), where it has been adopted in more than 10 countries (Barreix et al., 2018). Five years after the edition of the book, this number increased substantially, and Electronic Invoice data became one of the main data used for tax administration.

In Latin America, e-invoicing has sparked a revolution in the way businesses and TAs handle financial transactions. By facilitating the real-time transfer of billing data, e-invoicing simplifies the compliance process and enhances the overall efficiency of tax administration. In the LAC region, this technology has been a key driver for reducing tax evasion and improving transparency in economic activities, leveraging the use of data as pre-filled declarations. Some characteristics are worth mentioning:

- All documents are transmitted to the Tax Administration
- Common format
- Electronic signature.
- Digitally signed documents with PKI.
- Low-cost solution for small and mid-size taxpayers
- Hosted by the tax administration online (in the majority of countries)
- Stand-alone app to be downloaded (java based)
- Offered by third parties (under different model

In 2003, Chile became the first LAC country to introduce e-invoicing (Koch, 2019). By 2019, the government required that all invoices be made through e-invoicing with a copy routed to the tax authorities (IDB, 2021) With comprehensive transaction information accessible to the tax authorities, it becomes possible for the TA to prepare prefilled VAT returns for the taxpayer's review and payment (Jenkins, G.P. et al., 2023). The project started in 2017, and currently, 94% of Chilean taxpayers who declare a debit or credit use the prefilled tax return, which represents 93% of the VAT collection.

Governments are using electronic invoicing to monitor the movement of goods. Consequently, a growing number of countries in the Latin American region are now mandating the use of the "Carta Porte" for the transportation of goods. This document, developed as a complementary feature to electronic invoicing, provides real-time, comprehensive data about the goods in transit.

For example, in Brazil, since 2014, the tax administration has required the MDF-e (or Manifesto Eletrônico de Documentos Fiscais) to allow, in most cases, not to stop trucks to verify the document's existence.

The cases of new uses are increasing rapidly, such as for better efficiency in public procurement, for buyers searching for the best price available, for factoring purposes, GDP, tax gap estimation (Calijuri et al, 2023b) and so on. The series "Documentos Tributarios Electronicos and Big Data" shows the several uses of electronic documents in detail. (Bravo ,J, 2023; Garcia, G.; Calijuri, M.S., 2023; García, G.A. ,2023; and Feres, J.E.F; Calijuri, M.S., 2023)

7 COOPERATIVE COMPLIANCE PROGRAMS

A modern tax administration also means doing things differently improving the relationship with taxpayers. Recognizing that countries worldwide have struggled to establish a good relationship with their taxpayers, the cooperative compliance programs can represent a force that, using all the resources available, can shift how to manage taxpayer relationships. It is based on openness, collaboration, and mutual trust between taxpayers and tax authorities, and it is characterized as "transparency in exchange for certainty" (OECD, 2013, p. 29).

This trust-based relationship, initially called "enhanced relationship" and later known as "cooperative compliance", aims to achieve significant improvements in mutual transparency and, consequently, in voluntary compliance levels. The ultimate goal is to reduce compliance and/or administrative costs based on auditing and prevent disputes in the legal-tax relationship.

While the definition presented is broad, not all the conditions, such as legal framework, control risk framework and clear governance, among others, could be met simultaneously for an initiative to be considered a cooperative compliance program. Nevertheless, tax administrations worldwide have started many cooperative compliance initiatives that improve the relationship between tax administrations and taxpayers.

Despite not always being possible for these initiatives to guarantee a reduction in compliance and/or administrative costs, it is a starting point that is spreading rapidly. Brazil has initiated the CONFIA program in Latin America, and this experience has already inspired other countries to initiate their programs, as shown by Calijuri, M.S.; Oliveira, P.T.P. (2023), and Tostes, J.B; Calijuri, M.S. (2023). The OECD (2023) shows that almost 70% of tax administrations participating in the research have approaches of cooperative compliance targeting large taxpayers; more than 20% have these initiatives with high-net-worth individual (HNWI) taxpayers, and 34% have them with other taxpayers.

These programs could be a significant change in compliance risk management. It is a new approach to using the TA resources where the TA plays a role in tax auditing, concentrating resources in more complex or fraud cases. These changes do not happen from night to day. It has changed step by step in recent years, mainly due to the technology that allows tax administration to have better risk management or even better or even anticipate what the taxpayer should pay based on internal and external information. It has changed the nature of tax compliance, allowing for more target compliance and an improved relationship between tax administration and taxpayers.

Looking at the role of Digitalization in Cooperative Compliance programs, we can anticipate some benefits since it allows for real-time data exchange, automated risk assessment, and the monitoring of taxpayer activities. Advanced analytics and data processing capabilities enable tax authorities to identify discrepancies and anomalies swiftly, reducing the window for potential fraud. Moreover, technology facilitates secure data sharing between tax administrations and taxpayers, promoting transparency and cooperation.

Furthermore, the role of digitalization in cooperative compliance programs has potential for many other uses. The transition to digital payment recording, record-keeping, electronic invoicing and identity management has opened up numerous opportunities for tax administrations to enhance transparency and encourage compliance. Inspired by the International Compliance Assurance Programme (ICAP), a voluntary cooperative risk assessment and assurance program that includes several countries where the taxpayers operate, it can be used in the future to increase tax certainty and decrease the taxpayers'

compliance costs. An improved tax environment can also contribute to defining a country's attractiveness to investors and making companies more competitive worldwide.

8 DIGITAL TAXATION TRENDS WORLDWIDE

Governments worldwide are embracing digital tax solutions to modernize their tax systems, driven by the need to improve tax collection and efficiency. Notably, various countries have made significant improvements in implementing digital tax administration systems.

A significant shift has occurred in the Americas, as most tax administrations receive 100% of their tax returns online, and the tax payment is made online. Moreover, electronic invoicing and electronic payroll systems have been widely adopted. The current challenge is to provide pre-filed declarations, immediate tax returns and personalized VAT, focusing on simplifying tax compliance for taxpayers.

The integration of technology and data is a central theme in modern tax administration, and not less relevant, training their personnel new skill to use the technology and data available. As shown by the OECD (2023), 80% of tax administrations reported using big data in their operations, and the majority, using big data, are doing so to enhance taxpayer compliance.

OECD (2021) indicated the increased use of digital tools during the COVID-19 pandemic in research with 32 TAs. Figure 2 shows the use of data science/analytics techniques, while 30-50% reported the application of artificial intelligence (including machine learning), robotic process automation and digital identification technologies.

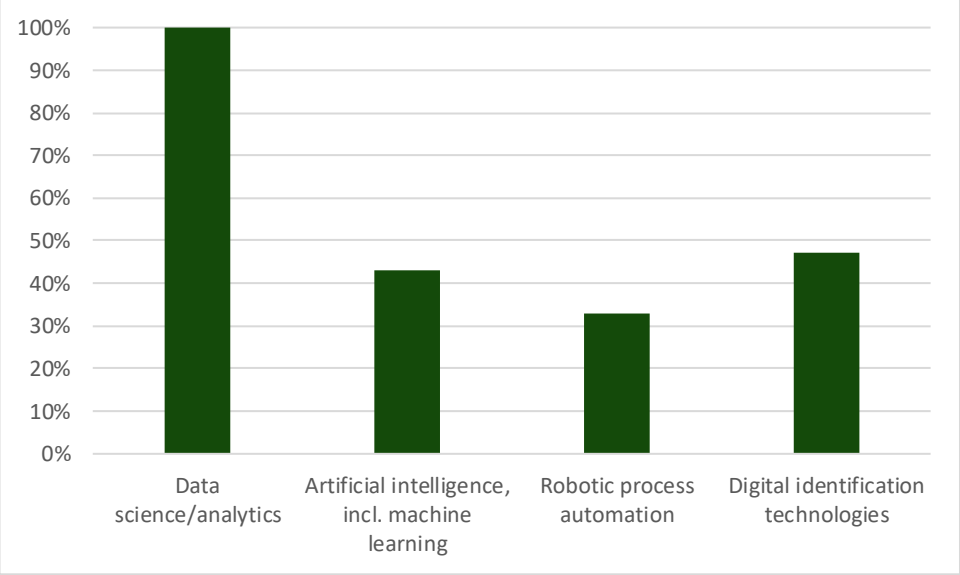

Figure 2 Use of new digital tolls Source: OECD (2021) p. 16

9 USES OF ARTIFICIAL INTELLIGENCE IN TAX ADMINISTRATION

Artificial intelligence (AI) is a broad term for techniques making machines "intelligent" (Bahashwan, A. et al., 2023). AI utilizes automation to enhance or replicate human intelligence to improve machines' analysis and decision-making capabilities and provides managers with unprecedented tools to make the decision-making process, leading to internal structural transformation in various industries. It also allows complicated and time-consuming tasks to be completed more effectively and efficiently.

Despite the gain moment achieved recently, Bizarro, P.A.; Dorian, M. (2017) pointed out that artificial intelligence (AI) was born in 1948 when William Gray Walter created two small robots, named "Elmer" and "Elsie", that were able to recognize and respond to stimuli while encountering obstacles. In 1956, the Dartmouth workshop proposed the term "artificial intelligence", marking the birth of AI as a discipline. Since then, the AI phenomenon has received considerable attention in various fields.

To understand how AI is applied in taxation, Milner C.; Berg B. (2017) explain that AI's role in taxation is like software that can automatically adapt to the input of different content and make judgments without specific instructions. TA can benefit from AI accurate data from new sources to drive more in-depth questions, answers, and analyses that previously were difficult, time-consuming, or impossible to accomplish. AI can also perform structured or unstructured tasks, mimicking the actions of humans, but with greater speed and accuracy.

For tax administrations, the vast volume of data they possess makes AI a valuable tool, primarily because AI's success depends on data quality and quantity. This privileged position enables tax administrations to leverage AI for various purposes, including direct combat against tax fraud and enhancing taxpayer services to promote tax compliance.

In terms of prevention, many countries have integrated AI-driven virtual assistants and chatbots to assist taxpayers in understanding their obligations and resolving doubts efficiently. AI is also employed to identify irregular situations to deter non-compliance. Also, in the fight against fraud, AI and big data are used to assess tax risks and segment taxpayers according to their likelihood of non-compliance, enabling more targeted controls. AI's potential benefits in tax systems include better application, higher-quality tax processes, administrative unity, legal certainty, reduced resolution times, and decreased conflict. However, ensuring that technology serves taxpayers must be guided by prudence, proportionality, non-discrimination, transparency, and information governance.

However, as Garcia-Herrera alerts "technology must be at the service of taxpayers, and the administrative action in tax application procedures must be inspired by the principles of prudence, proportionality, non-discrimination, transparency and information governance."

Even though it is still a controversial topic for some experts, the use of AI in tax administration is increasing. The OECD(2023) report shows that 54.4% of tax administrations have already implemented and are using Artificial intelligence (AI) and machine learning, and 28.1% are in the implementation phase. Also, Robotic process automation has been used by 50% of tax administrations (see table 2). This represents a 22% to 27% increase from 2018 to 2021.

	Data science/analytical tools			Artificial intelligence, including machine learning			Robotic process automation		
	2018	2021	Difference in percentage points (p.p)	2018	2021	Difference in p.p.	2018	2021	Difference in p.p.
Status of implementation and use	71.9	94.8	22.9	31.6	54.4	22.8	22.8	50	27.2
Technology implemented and used	19.3	5.2	-14.1	15.8	28.1	12.3	14	8.6	-5.4
Technology in the implementation phase for future use	19.3	5.2	-14.1	15.8	28.1	12.3	14	8.6	-5.4

Technology not used, incl. situations where implementations have not started	8.8	0	-8.8	52.6	17.5	-35.1	63.2	41.4	-21.8

Table 2 Evolution of the application of data science tools, artificial intelligence and robotic process automation between 2018 and 2021. Source: OECD (2023) p. 89

Also, figure 3 shows that TA mainly uses AI in risk assessment processes and detecting fraud and evasion.

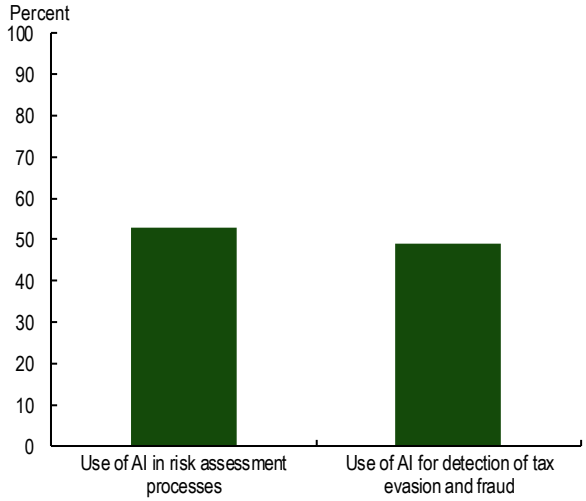

Table 3 Use of artificial intelligence by the tax administration. Source: OECD (2023), p. 90. Note: The figure is based on data from 52 jurisdictions that are covered in this report and that are included in the ITTI database.

10 CONCLUSION

Digitalization and technology have the potential to positively shape the way tax administrations collect, process, and act on information, which helps to improve the efficiency, transparency, and equitability of the systems. For taxpayers, digitalization can make tax compliance a more seamless and frictionless experience by integrating it into daily life and business activities. This is the vision for the future: having a tax administration so integrated into the day-by-day of taxpayers that it becomes invisible to them.

The future of digital tax administration holds promising developments. Emerging technologies, such as artificial intelligence, blockchain, and data-sharing agreements, are expected to play pivotal roles in further enhancing tax collection processes. Moreover, potential developments in global tax policy will continue to shape the landscape of tax administration, influencing international cooperation and the standardization of digital tax practices.

While the benefits of digital tax administration are evident, addressing the challenges and concerns associated with this transformation is crucial. Data security, privacy, and the need for robust technology infrastructure must be thoughtfully considered. Despite the many benefits of e-invoicing, artificial intelligence, and other digital tools, their widespread use generates a substantial volume of data tax authorities must manage securely. The sheer scale and sensitivity of the financial and tax-related data exchanged through systems need a strong focus on cybersecurity and data protection practices. These concerns must be proactively managed to ensure the public's trust in the tax system.

TAs in Latin America and worldwide must employ sophisticated digital security measures to safeguard against potential breaches and data leaks, ensuring the continued success of digital initiatives while preserving the confidentiality and integrity of the data they handle (Campbell and Hanschitz, 2018) .

Finally, an important topic raises the attention. Amid all the new technology, managing the workforce is critical. An essential aspect to consider is the age distribution within the tax administration staff. As of 2021, the age profiles of 57 tax administration staff reveal that a substantial portion of the employers, 29.2%, fell within the age group of 45-54 years, and older than 54 years represented 25.8% (OECD,2023) , mirroring the percentage of employers under the age of 35 years, who also accounted for 25.8%.

The age distribution adds significance in rapid digitalization, where the demand for digital skills surges. To meet this challenge effectively, there is an immediate and pressing need for both training and the active recruitment of new talent. Balancing the expertise and experience of more seasoned employees with the fresh perspectives and digital fluency of younger generations is a critical step in ensuring the successful adaptation of tax administrations to the evolving digital landscape.

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