

Digitalization of Tax Administration in Latin America and the Caribbean

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Digitalization of Tax Administration in Latin America and the Caribbean

Best-Practice Framework for Improving E-Services to Taxpayers

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Abstract

Technological advances offer enormous and still unexploited opportunities to the tax administrations of Latin America and the Caribbean to improve their tax services. This report, produced by the Inter-American Development Bank in collaboration with the WU Global Tax Policy Center (GTPC) at the Institute for Austrian and International Tax Law (Vienna University of Economics and Business), assesses current digitalization levels in tax administrations across the region, describes the legal framework necessary for digitalization, and identifies areas for improvement based on good tax administration principles and best practices. It offers roadmaps for improving digital taxpayer services that consider important differences across more and less digitally advanced countries. In all countries, progress on the digitalization of tax services can lead to better tax compliance and governance. However, less advanced countries should focus first on facilitating taxpayer connectivity and the digitalization of tax documents; more advanced countries should implement automated tax filing and data-sharing among government agencies.

Abbreviations and Acronyms

AFIP	Argentinian Tax Administration	FATCA	Foreign Account Tax Compliance Act
AI	Artificial intelligence	FTA	Forum on Tax Administration (OECD)
API	Application programming interface	GTS	Golden Tax System (China)
ATO	Australian Taxation Office	HARPIA	Risk Analysis and Applied Artificial Intelligence System of the Brazilian Tax Administration
B2B	Business to business	HTS	Home Tax Service (Korea)
B2C	Business to consumer	IAMTAX	Integrated Assessment Model for Tax Administration (World Bank)
BEPS	Base erosion and profit shifting	ICT	Information and communication technology
CbCR	Country-by-Country Reporting	ICTD	Directorate of Information and Communication Technology (Tanzania)
CIAT	Inter-American Center of Tax Administrations	IDB	Inter-American Development Bank
CTCS	Comprehensive Tax Compliance System	IMF	International Monetary Fund
COTS	Commercial off-the-shelf	IoT	Internet of Things
DI	Digital identity	IOTA	Intra-European Organization of Tax Administrations
DIAN	Colombian Tax Administration	IT	Information Technology
E-CAC	Center for Virtual Assistance to Taxpayers (Brazil)	ITAS	Integrated Taxpayer Assistance System (Chile)
EoI	Exchange of information	LAC	Latin America and the Caribbean
ETCR	Electronically traceable cash receipt		
ETI	Electronic tax invoice		
ETP	Electronically traceable payment		
EU	European Union		
EWS	Early-warning system		
EY	Ernst & Young (tax consultants)		

LTB	Local Taxation Bureau (China)	SPED	Public System of Digital Bookkeeping (Brazil)
MOPAS	Ministry of Security and Public Administration (Korea)	STA	State Taxation Administration (China)
NTIS	Next-Generation Tax Integration System (Korea)	STB	State Taxation Bureau (China)
NTS	National Tax Service (Korea)	SUNAT	Peruvian Tax Administration
OECD	Organisation for Economic Co-operation and Development	TA	Tax administration
PIT	Personal income tax	TADAT	Tax Administration Diagnostic Assessment Tool
RBA	Risk-based approach	TIN	Tax identification number
RFB	Brazilian Tax Administration	TIS	Tax integrated system (Korea)
RPA	Robotic process automation	UN	United Nations
SAT-G	Guatemalan Tax Administration	USAID	United States Agency for International Development
SAT-M	Mexican Tax Administration	XML	Extensible markup language
SII	Chilean Tax Administration		

Executive Summary

Technological advances have disrupted the way tax administrations (TAs) traditionally operate. Although the term “disruption” usually has negative connotations, technology in fact offers numerous opportunities for improvement in every area of TA operations (tax services, compliance control, performance management, governance, and risk). Technology is a key factor in the digital transformation of TAs, and to be effective it must work in harmony with other organizational strategies.

This document focuses on the tax services provided by TAs in Latin American and some indicative Caribbean countries, as well as the transformative effects of technology applications on taxpayer services, challenges in terms of taxpayer rights, and the impact of digital transformation on good tax policy principles. Services are addressed both as a crucial area of TAs’ administrative authority in the implementation of tax law as well as an important step toward effective and voluntary compliance. As such, digitalization of these services unleashes the potential for better tax compliance and governance while also highlighting existing constraints. Thus, the objective of the study is to compare tax administrative practices among Latin American and Caribbean (LAC) countries regarding the provision of tax services, assess the level of their digital maturity, discuss best practices from both LAC and non-LAC countries, and propose ways to improve tax services in LAC with the help of digital technologies and implementation of digital tax policies.

Digital taxpayer service provision is intended to improve the efficiency of TAs’ operations across all stages of the tax cycle, as well as the relationship between TAs and taxpayers. Improvement in tax revenues is also likely, although this largely depends on broader tax system design. The digital transformation of each TA depends primarily on the specific objectives involved. Although goals may converge in many instances, there may also be situations in which the needs of each TA are different. Thus, there is no one-size-fits-all approach to the successful digitalization of a TA. Accordingly, the principles and concepts fleshed out in this

report aim to provide a framework or principles-based guide that each TA can follow and tailor to its specific needs.

This document presents an analytical framework that rests on three main pillars: (i) an assessment of current digitalization levels in TAs—that is, the examination of the status of e-tax service provision in the LAC country in question and an assessment of its digital maturity; (ii) the legal framework for digitalization and the extent to which it enables or limits the digitalization process; and (iii) an assessment of areas for improvement based on good tax administration principles and best practices from experience in LAC countries, where applicable. The concept of a “digital maturity model” is presented in Chapter 3 and more fully developed in Chapter 5; it is key to the assessment of current digitalization levels (the first pillar) as well as providing guidance on areas for improvement (the third pillar).

For the purposes of this document, the LAC countries have been divided into three tiers, consistent with the digital maturity model, indicating the current level of digitalization of their TAs (and therefore also their potential for future improvement). The analysis reveals that one country’s experience with the digital transformation of tax services cannot automatically be duplicated in another country. However, a country’s experience can serve to highlight the steps taken to ensure that digital tax services are rendered effectively elsewhere, as well as to highlight constraints that would call for alternative approaches or trade-offs. In this sense, a general conclusion from our analytical framework is that more digitally advanced processes can only be implemented in less digitally advanced countries where a core of basic technological infrastructure exists. For instance, facilitating connectivity for all taxpayers and digitalizing tax documents should be carried out before moving on to automated tax filing and implementing models of data sharing among different government agencies.

Best practices for the digital transformation process in LAC countries include the following, in the recommended order of implementation:

- Electronic delivery of basic services (registration, e-filing, and e-payment)
- Effective safeguards to protect taxpayer rights
- Adoption of tax inboxes as communication channels between taxpayers and TAs
- Adoption of chatbots¹ and virtual conversational assistants
- Pre-filled income tax returns
- Adoption of e-invoicing systems
- Pre-filled VAT tax returns

¹ “In its purest form, a chatbot is a computer program that allows interaction between humans and technology. As the name suggests, chatbots were originally limited to text-based communication; however, as the technology has improved this interaction paradigm now extends to other input methods including touch and voice” (Boost.ai, undated).

- Adoption of virtual file systems
- Adoption of public digital bookkeeping systems

In terms of the roadmap that each TA should follow to improve its provision of digital taxpayer services, the starting point should be the effective delivery of basic e-services such as taxpayer registration, e-filing, and e-payment of tax obligations. These services are pre-conditions for the subsequent introduction of pre-filled income or VAT tax returns based on data shared among the relevant tax agencies. Once an effective e-services system has been implemented, TAs might also wish to adopt e-invoicing systems, though some countries have not done so despite having a solid system of e-services already in place. This shows that the optimal way to go digital is not always linear. However, following the above steps ensures a smoother transition in terms of consistency in the provision and efficiency of tax services. Furthermore, TAs may also consider providing other types of services that support but are not directly linked to their core activities. These are mostly communication channels and processes that facilitate service provision and relations with taxpayers (i.e., tax inboxes, chatbots, virtual assistants, and virtual file systems, as well as digital bookkeeping).

The adoption of a specific service and the (digital) method for implementing it should consider several factors such as a country's legal framework, the availability of technological resources and cost of introducing new resources, the suitability of each technological tool for delivering the desired result, and the objectives of each TA. Based on the current situation with respect to digitalization in LAC, it appears that the experiences of countries in the first tier (best practices) could be adopted by second tier (intermediate-advanced) countries but not by third tier (least advanced) ones. Similarly, third-tier countries may find it easier to adopt the digital solutions and practices of second-tier countries; these consist mostly of electronic tax filing, electronic communication, and some form of automated tax guidance.

Case studies from countries outside the LAC region that are regarded as pioneers in this area—China, Estonia, Korea, and Russia—show that these mostly use sophisticated integrated tax information systems, a combination of artificial intelligence (AI)-based advanced technologies, data analytics, cloud computing, and blockchain. They also tend to gradually further develop their tax processes to support real-time tax compliance and collection. Given that these measures are technologically highly advanced in terms of tax services, there are few lessons to be learned from countries in other regions that are relevant to LAC, and it would be unwise to attempt to replicate these experiences in the region. Instead, the processes that allowed these countries to reach their current levels of digitalization should be studied. Best practices for LAC may be drawn by examining the steps China, Estonia, Korea, and Russia have taken over the years to reach their current levels of digital maturity, as well as the obstacles they have faced and the goals they set out to achieve. These are the questions that each country in LAC should seek to answer in their attempts to move to the next level of digitalization.

Introduction

This document examines the main factors affecting digital transformation in tax administrations (TAs) and the role of digitalization in implementing good tax administration policies.² It uses the Latin American and Caribbean (LAC) region as the main case study and attempts to tailor solutions for improving tax services based on the current situation and potential for improvement in each country. Extraregional case studies are offered mostly as best practices and discussed only to the extent that their experiences can inform LAC countries in the design of their digital tax transformation roadmap.

Background, Scope, and Relevance of Study

In performing their tax functions, TAs continue to face challenges in terms of keeping abreast of technological developments and globalization. Their main role is to ensure, with the support of the revenue authorities, that tax laws are enforced, and taxpayers comply with their tax obligations. This is generally achieved by providing services to taxpayers that facilitate tax compliance. The effectiveness of this effort depends on a range of factors that are not always under the control of the TA, but rather are influenced by the state of the economy, government priorities, and culture.

In 2016, the Organisation for Economic Co-operation and Development (OECD, 2016b) published a practical guide for TAs on how to keep up with an ever-changing and technologically

² This document deals only with TAs as narrowly defined and thus excludes customs authorities and processes from its scope. Other services usually offered by TAs such as national health insurance collections and disbursements and social security collections and payment of benefits are also excluded from the scope of this study. Any reference to the abovementioned services in this document (e.g., Table 1.1) is only for the purposes of delimiting the tax functions of TAs in LAC and thus does not intend to extend the scope of the research.

developing world. These changes require TAs to alter their approach to providing and distributing services by using technologies that improve risk management and resource allocation and offer the potential to increase revenue collection. Although LAC countries pledged to implement the OECD recommendations, the extent of practical implementation varies across the region, and very little has been clarified regarding the overall steps required for the digital transformation of TAs in LAC. However, broadly speaking the goal is for tax authorities to increase the efficiency and organization of their work by adopting appropriate technologies and instituting best-practice approaches to monitoring and measuring their operations and performance.

Improving efficiency is only one part of the equation, however. It is also important to establish a positive relationship with taxpayers to improve voluntary compliance, enhance trust, and boost revenue collection. Accordingly, it is difficult to separate the central idea of implementing new technologies from the very traditional principles of good tax administration and good tax policy. The latter always need to be kept in mind when developing recommendations for digital tax transformation. With respect to the central theme of this document, for example, the OECD's guidance on good tax administration principles suggests that TA relations with taxpayers should be characterized by responsiveness, interactive communication on changes in tax law and procedures, consistency and transparency in the application of tax law, and the use of taxpayer information only in the manner permitted by law (OECD, 2001). In this context, responsiveness relates to the timely provision of accessible and accurate information to taxpayers by the tax authorities. This can be achieved to a significant extent by implementing electronic means of communication including electronic guidance, e-filing of tax returns, e-payments, and online access to account balances. Interactive communication allows taxpayers to provide feedback on changes to administrative procedures; this enhances the TA's ability to minimize unnecessary compliance costs and build trust with taxpayers. Transparency and consistency, meanwhile, help to ensure that tax law is applied both fairly and reliably and that taxpayers are informed of their rights and duties in a timely manner.³ This document links these good tax administration principles with specific digital tax services and processes, using them as benchmarks in the proposed framework for the use of technology to improve tax services in LAC.

While considering the general principles described above, tax reforms should nonetheless be based primarily on the specific needs of the revenue authorities. This document there-

³ Transparency involves trade-offs in the way a TA performs its services. On one hand, constitutional provisions governing TA actions and taxpayer rights require the TA to provide its services in a transparent manner. On the other hand, the TA's scope of action is justified for public interest reasons and should not be revealed to the taxpayer except under very specific circumstances. This is the case even in the absence of digitalization of the tax process and the implementation of new technologies, and this balance should continue to be preserved despite the challenges involved.

fore examines the specific tax, legal, cultural, administrative, and budgetary frameworks in LAC and takes them into account in developing the proposed benchmarks. For example, one of the most important lessons emerging from digital tax administration reform experiences in LAC is the need for simplification of the tax system. While “tax system simplification” is a very broad term with varying interpretations, it is used here to refer to the simplification of administratively costly and cumbersome tax instruments that further complicate the work of TAs in developing countries (e.g., income taxes). Simplification also refers to the streamlining of complex tax procedures that erode compliance due to the number of steps required for assessment and/or increase taxpayers’ ignorance or confusion regarding their tax liabilities and responsibilities. Simplification of the tax system and, more importantly, of tax administration processes represents a key step for all developing countries, which are traditionally characterized by low-compliance tax regimes.⁴ Digital technologies can potentially be used to address this issue by facilitating data collection, processing, and management. Accordingly, data management is an important factor in modernizing TAs and simplifying the tax collection process.

Simply collecting large amounts of data does not satisfy the imperative of improving tax administration, however. Digital tax transformation consistent with the principles of good tax administration requires an appropriate strategy that goes beyond data collection and management. Specifically, good tax administration and TA digital transformation require one to know the level of funding that will be available and what the costs and benefits of various possible changes in the legal framework and institutional infrastructure might be.⁵ Accordingly, the digital roadmap to be adopted by a TA should be based on a preliminary analysis of what the TA wants to achieve. Key initial information includes a breakdown of the existing uses of administrative resources, the results obtained from the analysis of the use of these resources, and information on the tax system structure (tax types and processes). As the transition to the fourth industrial revolution has been concomitant with the generation of increasing volumes of data, it is critical that these data be relevant and reliable so that they can be used by TAs for the purposes identified above.

This document addresses the lack of existing research on the ways digitalization can help to improve tax administration in LAC, consistent with the aforementioned principles of good

⁴ Bolivia’s 1986 TA reform is instructive in this respect, for instance, while Chile and Colombia have proven that TA performance can be improved through the effective simplification of tax policy, even with less drastic tax measures (see Bird and de Jantscher, 1992).

⁵ See Bird and de Jantscher (1992). Moreover, data entry is the key issue for data management policies in TAs. Multiple digital technologies should be used to ensure that the data handled by TAs are of sufficient quality and that data input occurs only once. Further information is provided later in this document on the concept of data management as a factor in determining, among other things, the level of digital maturity of tax services and TAs in general.

tax administration (i.e., responsiveness, transparency/consistency, and interactive communication).⁶ There are many issues that need to be explored in detail, including the criteria that each TA should use in pursuing digital transformation, the legal framework for facilitating this transformation, and compliance with legal principles on taxpayer rights and the rule of law. The LAC region provides an ideal group of countries for examining these issues as it is relatively uniform in its cultural characteristics and legal processes, yet it also exhibits marked differences in terms of tax processes and the level of digital maturity of TAs. Intraregional comparisons of the provision of tax services will be complemented by comparisons with best practices from countries outside the region with a view to determining whether (and to what extent) lessons can be learned for some or all LAC countries.

The analysis that follows is subject to several caveats relating to the measurement of TA performance in LAC before and after the introduction of specific technological tools. Specifically, it is difficult to measure TA performance in the absence of performance indexes and relevant data for each TA in LAC. A comprehensive assessment would first need to measure tax gaps (potential taxes versus declared taxes, declared taxes versus taxes paid, and taxes paid versus those that reach the treasury) and the resource costs (administrative, compliance, efficiency, evasion) of procedures relating to taxpayer services. Such a process would effectively constitute a cost-benefit analysis of the inputs and outcomes of current tax processes as compared with those of digital tax processes.

This document does not provide an empirical analysis of the data on TA performance but rather attempts to map the current situation in LAC and highlight the potential for digital technologies to bring TAs in the region further in line with principles of good tax administration. The assessment encompasses the institutional and tax framework and level of digital maturity of TAs in LAC, and it inevitably produces different results for each country. Accordingly, it is impossible to develop a single stance on the policy issues identified below; instead, the document seeks to provide broad guidance on the most appropriate policy for each country in light of its current tax situation.

Methodology and Sources

The approach in this document consists primarily of a comparative analysis of tax services and processes in various LAC countries (i.e., a horizontal comparison). The countries are

⁶ This document does not address the overarching tax principles by which tax systems are typically evaluated, namely equity, efficiency, and administrability. However, the principles of responsiveness, transparency, and interactive communication are further expressions of these overarching tax principles. If digitalization is successful in achieving them, this can contribute to the overall reform of the tax system, thereby enhancing equity, efficiency, and administrability.

divided into three groups or tiers according to their level of digital maturity,⁷ as measured with reference to a combination of digital maturity models developed by several international organizations.

Methodology

The models used in the analysis consist of either general assessment frameworks or case studies of TAs in specific countries. Accordingly, the digital maturity classification of individual LAC countries in this document relates only to tax administration and cannot be considered an objective classification of digital maturity more generally in the country. The classifications are also specific to the data and sources used in the study. Furthermore, the country classifications are supported by information included in the recent OECD report on tax administration (OECD, 2021c), which is based largely on national surveys and data provided by the International Survey on Revenue Administration (ISORA).

In terms of selecting the countries to be used as case studies in the comparison, initial information was provided by a broad assessment in the Economic Outlook for Latin America (OECD et al., 2020) report following the COVID-19 pandemic. This document provides evidence that although the region entered the COVID-19 crisis with relatively few digital resources, access to networks and devices has expanded and increasing numbers of businesses are using digital solutions in their everyday operations. An overview of supply chain digitalization in Latin America found that the best-performing countries in terms of internet access, use of the internet to acquire inputs, and internet banking access include Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, and Uruguay (Development Bank of Latin America,⁸ 2020).

In addition, information on the status of the digital ecosystem in LAC (i.e., the structure and technological sophistication of the region's productive sector) is assumed to provide a good indication of digital maturity in the countries, as well as the opportunities for leveraging the benefits of digital transformation in public administration. The Digital Ecosystem Development Index created by the Development Bank of Latin America is based on eight multicomponent pillars: infrastructure, connectivity, household digitalization, digitalization of production,

⁷ As discussed more fully in Chapter 3, the term “digital maturity” as used in this document refers not only to the available technological tools but also more broadly to the combination of available technologies and integrated systems that yield the most appropriate resource allocation for each TA's goals. It therefore has a dual meaning. On one hand, we assess the digital maturity of TAs based on the technological resources available and the complexity of tasks performed. On the other hand, we also measure digital maturity in terms of the efficiency of digital tax service provision based on a combination of digital tools, irrespective of their individual sophistication.

⁸ The Development Bank of Latin America (Banco de Desarrollo de América Latina) is also known as CAF for its previous name in Spanish, Corporación Andina de Fomento.

competitive intensity, digital industries, factors of production, and regulatory frameworks. In addition, the Digital Evolution Index prepared for Latin America and the Caribbean in 2018 (Institute for Business in the Global Context, 2018) found that nearly half of the 24 LAC markets demonstrate moderate momentum, and a few are advancing rapidly. In the latter group, Chile, Colombia, Costa Rica, Mexico, and Uruguay rank high in terms of their level of digital evolution and rate of progress. Lastly, a more focused study of the degree of digital development in LAC revealed that the countries of the region may be divided into three groups in terms of the digital transformation of their public administrations: developed, medium, and underdeveloped (D. P. Chavarry Galvez and W. P. Chavarry Galvez, 2021). That study classifies Argentina, Brazil, Chile, Colombia, and Uruguay as developed and the Dominican Republic, Ecuador, Mexico, Panama, and Peru, as medium developed. Bolivia, El Salvador, Guatemala, Honduras, and Paraguay are included in the group of underdeveloped countries due to their scant progress building infrastructure for innovation and information and communication technology (ICT). In contrast, countries with high digital development scores include those with high levels of investment in education and human capital as a share of GDP.

Based on this information, and on the availability of public information relevant to the scope of this document, the countries of Argentina, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Guatemala, Mexico, and Peru were selected as case studies for the horizontal comparison in this document. This selection includes countries from all geographical areas of the region and reflects the varying levels of digital development across LAC that will serve as a starting point for categorizing TAs in terms of their digital maturity. Lastly, a broad comparison of the digital ecosystem in LAC compared with those of the European Union (EU) and Asia-Pacific regions finds that the region's ecosystem remains at only an intermediate level of development, despite the significant advances of the last few years. The moderate pace of digitalization in the region makes a vertical comparison with countries outside LAC very important for informing future digital tax policies.

The selected LAC countries were divided into three groups or tiers as follows:

- Tier 1 (higher level of digital maturity): Brazil, Chile, Mexico
- Tier 2 (medium level of digital maturity): Argentina, Colombia, Peru
- Tier 3 (lower level of digital maturity): Caribbean Countries (Costa Rica, the Dominican Republic, Guatemala)

This classification represents the assessed level of digital maturity based on the factors analyzed in Chapter 3 herein. It corresponds broadly to the countries' rankings in terms of their ratio of tax revenue to GDP, as reported in Revenue Statistics in Latin America and the Caribbean 2021 (OECD et al., 2021). It is also supported by information found both in the recent OECD report on tax administration (OECD, 2021c) and on the websites of each country's TA.

Although most existing digital maturity indexes use country surveys (or services supplied by various government agencies) to measure the digital maturity of several independent factors that are considered to reflect an “ideal” level of digital development, the classification proposal in this document considers TAs alone. The aim is to provide a general assessment for each TA and country based on the range of tax services that reflect the ideal level of digital development (as described in the digital maturity models) and to offer recommendations for a digital tax transformation roadmap that considers the broad institutional and legal framework of each country.

In addition, the selected LAC countries are compared with a number of countries from outside the region—China, Estonia, Russia, and South Korea—that are considered leaders in terms of the modernization of their tax services or the range of digital tools implemented to improve the effectiveness and efficiency of their tax services.⁹ Russia was specifically identified as a best-practice case in the recent OECD Tax Administration 3.0 report (OECD, 2020b), while the recent OECD Tax Administration 2021 report (OECD, 2021c) highlights China, Estonia, and South Korea as role models in the field of specific tax services. These countries have been selected based mainly on the fact that their levels of digital maturity range from medium to high and their digital transformation has been achieved gradually based on their institutional, tax, and legal background. In addition, their size and population are easily comparable with LAC countries in all tiers. For example, Russia is comparable to Argentina, Brazil, and Mexico in terms of size and population, while Estonia and Korea—being smaller countries—can be compared with Colombia, Guatemala, and Peru.

The international comparisons in this document will focus not only on digital maturity, however, but also the factors that influence that degree of maturity. Multiple such factors must be evaluated when determining whether a best practice is applicable to LAC. Estonia, for instance, is far more technologically advanced than Peru, and the lessons learned from its experiences in digitalizing tax administration may therefore only be relevant for first-tier LAC countries. The same holds true for the horizontal comparison among LAC countries. Despite the heterogeneity of the region’s countries in terms of revenue performance and inequality, they nonetheless share several common cultural characteristics and traditions. The

⁹ The taxonomy of the selection of countries is based on the institutional and legal framework of each country; afterwards, this taxonomy is considered in a digital context. The subsequent vertical comparison of LAC with countries external to LAC is carried out because the policy relevance of the level of digitalization of TAs in the selected LAC countries is enhanced when confronted with realities from outside the region. The extra-regional countries were selected based on several studies of efficiency and resource allocation in TAs conducted by international organizations, in which these countries were recognized as leaders in the digitalization of tax procedures. No assessment has been made of the similarities or differences in their tax systems with respect to those of LAC. Despite their institutional and tax structure differences with LAC, the countries may nonetheless offer relevant insights for the design of a future digital roadmap for LAC.

experience of one country in the region may thus be instructive for others, depending on their level of digital maturity, available resources, and the political and legal framework.

The comparisons in this document draw on statistical data and various international tax policy reports published by international organizations. Country-specific information is taken from the websites of the different TAs, where publicly available annual reports provide information regarding new processes that have been implemented and digital projects currently underway.¹⁰

This document is divided as follows: Chapters 1, 2, 3, 4, and 5 provide a high-level overview of the institutional capacity, legal frameworks, tax regimes, and digital tax processes of TAs in the selected countries. The results of this analysis are corroborated by surveys conducted by international organizations (IMF et al., undated; OECD, 2019b), which provide the basis for the horizontal and vertical country comparisons.

Chapter 1 describes the current TA institutional framework in these countries as well as the major taxes levied in each. Chapter 2 discusses the legal underpinnings of tax administration and relates these to constraint on or facilitation of digitalization of tax services. Chapter 3 presents the concept of digital maturity as distinct from general maturity and shows how the former can be used to assess the efficiency of tax services. One model of general maturity is presented, followed by three separate but related models of digital maturity. Chapter 4 presents an overview of the current situation of e-tax services in selected LAC countries. Based on these models and the discussion of the current situation, Chapter 5 presents a general framework for assessment of the digital maturity of e-tax services in these countries.

Chapter 6 offers a high-level overview of the main legal constraints faced by each of the proposed policy options for enhancing digital tax services. However, a lack of detailed information on the legal and institutional frameworks governing national TAs makes it difficult to comprehensively assess the potential for reform in this area. Moreover, even if such analysis were possible, frequent updates would be required to account for changes in the TAs' annual revenue needs and budgetary capacities. As a result, the legal analysis performed is mostly principle-based rather than rule-based (i.e., the legal assessment is based on general principles acknowledged by all examined jurisdictions rather than on specific legislative provisions of each country). In this regard, relevant case law and jurisprudence, tax legislation, and administrative guidelines are used to support the conclusions and recommendations of this document.

Sources

The main sources used in the study are legal texts (including legislative documents and tax administrative acts and guidelines, whether binding or nonbinding), policy documents of

¹⁰ See Chapter 4 for a description of the status of digital and other tax services in LAC.

international organizations, and case law of the courts of specific jurisdictions involved in the country comparisons. Other institutional papers and international guidelines are also considered. Legal sources are supplemented by technical, theoretical, and empirical reports from the fields of computer science and public management. The above sources will form part of the theoretical and legal analysis. Other sources (e.g., IMF et al. [undated]) include data from countries' experiences that are publicly available regarding the tax administration function of the examined countries and the level of their digitalization.

The country comparisons are intended to function as a broad guideline or roadmap of how a TA's digital reform can be accomplished. For this purpose, a general framework is set out below stressing primarily how digital maturity should be understood and secondarily how the use of both advanced and less sophisticated digital tools by TAs can improve the performance of their services. In this regard, we highlight the pros and cons of some disruptive technologies that are gaining ground in tax administration and examine how the use of these technologies can assist in making tax services more efficient. The efficiency of tax services can be further assessed based on how satisfied taxpayers are with the service, how digital service improves the allocation of resources within tax administration, and how costly the service is before and after the implementation of digital tools. It should be reiterated that given the lack of actual data on the performance before and after the implementation of some technological processes and of the changes proposed in this document, the efficiency assessment needs to be made based on how close the proposed solution can bring TAs in LAC to the principles of good tax administration as exemplified by the current state of the art in the region and by the potential of certain technologies.

Lastly, the national comparisons among LAC countries and between LAC countries and those external to LAC are based on averages. These averages refer indicatively to countries' tax policy directions and the main tax instruments their TAs use to assess tax liability, capacity-building constraints, and administrative resources; the level of collaboration of public and private sector; and the level of integration of public services in general.

Current Institutional Framework and Tax System in Latin America and the Caribbean

“Institutional framework” refers to the structure of tax administrations (TAs) in Latin American and Caribbean (LAC) countries and their main competencies. Traditionally, TAs have been a single directorate within the relevant ministry; however, recently the trend is toward setting them up as more semi-autonomous organizations.¹¹

¹¹ When a TA is set up as a single directorate in the Ministry of Finance, the TA's functions are the responsibility of a single organizational unit that is located within the structure of the Ministry of Finance. On the other hand, those TAs constituted as a unified semi-autonomous body are organizationally separate from the Ministry of Finance and their functions and the necessary support activities (e.g., information technology and human resources) are carried out under the aegis of this unified semi-autonomous body, which in turn reports to the Minister of Finance. The semi-autonomous body can also be structured to report to a board, in which case the board oversees the senior management officials. TAs can also work in an integrated fashion (e.g., Integrated Revenue Authority) where all tax, customs, and social security administrations are merged into one agency with different levels of functional integration. For a detailed description of TA organizational structures and more, see OECD (2013).

Institutional Framework

Competencies of TAs in LAC countries are distributed among multiple directorates often divided into sub-bodies within the TA, characterized as autonomous or semi-autonomous and supervised by a superior body or board. Data available from the Inter-American Center of Tax Administrations (CIAT) and Organisation for Economic Co-operation and Development (OECD) member countries reveals that the most common pattern is an organization under a single directorate; a minority of tax administrations are organized as a unified semi-autonomous agency reporting to a board.¹²

Salient aspects of the institutional framework of TAs are the design of their internal structure and the nature of their autonomy. Institutional autonomy may, for instance, be dependent on budgetary autonomy (both operating budget autonomy and managing the capital budget), which normally increases with country income levels. Individualized data on CIAT countries show the diversity of choices made by countries regarding their TAs' structure. As to the LAC countries concerned, Costa Rica and Guatemala (classified as third-tier countries in our taxonomy) are both exceptions to the standard of a single directorate, as they have adopted either a structure with shared competencies between different directorates (Costa Rica) or a tax superintendency (Guatemala).¹³ The integration of social security and customs competencies (i.e., following the integrated model of organization) is also subject to a lot of diversity. TAs that participate in social security operations are, among others, Argentina, Brazil, Mexico, and Peru (classified as first- and second-tier countries based on our digital maturity classification).

This organizational structure of the TAs in LAC countries has consequences for the level of effectiveness and efficiency of the TAs' functions in general. Governments usually establish semi-autonomous revenue bodies for three reasons: (i) the semi-autonomous structure reduces political interference in the operations of the revenue administration, while (ii) it allows managers to be more responsible and accountable for the fulfillment of their objectives, and in this regard (iii) a semi-autonomous model increases managerial capacity, which is crucial for decisions relating to budget management policies including human resources. In other words, the formal organization of the TA's structure reflects the nature of its autonomy in terms of actual decision making regarding budgeting and human resources. This autonomy varies significantly among countries, as shown in Table 1.1. For example, Mexico and Peru, despite being evaluated as medium or high level in their digital maturity, have limited managerial and financial autonomy, including budgeting and human resources. This can be

¹² Junquera-Varela et al. (2019, 4) note that “in Latin America, establishing semi-autonomous revenue bodies is the predominant pattern of TA reform. The TAs of Bolivia, Guatemala, Mexico, Peru, and Venezuela have adopted the legal status of semi-autonomous revenue authorities.”

¹³ See also IDB (2013).

Table 1.1.**SUMMARY OF THE INSTITUTIONAL FRAMEWORK IN LAC COUNTRIES CONCERNED**

Country	Institutional framework	Customs	Social security contrib.	Organizational structure ^a	Autonomy internal structure	Autonomy operational budget	Autonomy capital budget
Argentina	Semi-autonomous agency with a board	Yes	Yes	Function	Yes	Yes	Yes
Brazil	Single directorate	Yes	Yes	Function	Yes	Yes	Yes
Chile	Semi-autonomous agency with a board	No	No	Function	Yes	Yes	Yes
Colombia	Semi-autonomous agency with a board	Yes	No	Function	No	Yes	Yes
Costa Rica	Shared competence in different directorates	No	No	Function	Yes	No	No
Dominican Republic	Semi-autonomous agency with a board	No	No	Other	Yes	Yes	Yes
Guatemala	Tax superintendency	Yes	No	Other	Yes	Yes	No
Mexico	Semi-autonomous agency with a board	Yes	No	Function	Yes	No	No
Peru	Semi-autonomous agency with a board	Yes	Yes	Function	Yes	No	No

Source: Based on the 2019 International Survey on Revenue Administration (ISORA) (Díaz de Sarralde, 2019).

^a A function-based model of organization is the rule in many countries and works by organizing all functions and taxes for which a TA is responsible under the same group. This allows for uniformity, standardization, and simplification of the relationship between TAs and taxpayers. Examples of common activities that fall under a function-based model are returns processing and payment and related accounting systems, audit and investigations strategies, enforcement of taxes, and legal procedures. In addition, the so-called support functions that are not core tax functions but assist them also fall under the same organization: human resources including staffing and recruitment, compensation, employee relations, finance and budgeting, information technology (IT), and the respective management of the TA's IT platform (both hardware and software). For a more detailed analysis of the function model, see Kidd (2010).

explained by the varying range of powers delegated to revenue bodies by different national systems, which is a decision based on multiple factors (i.e., the general state of development of the public sector and management of public administration and the organizational model of TAs). Autonomy over human resources includes the allocation of workflows but also the remuneration of tax officials. This is one of the main problems that we encounter especially in the TAs of Chile and Mexico, where tax officials' salaries are tied to the civil service (IDB, 2013). This makes it more difficult to attract employees to work for these TAs because it is often the case that tax officials' salaries are lower than what they could earn in the private sector; hence, the level of development (or maturity) of those TAs is negatively affected as the talent pool likely to contribute to the improvement of TA performance will be limited.

One of the powers of autonomous decision making that determines the management and operation of a TA refers to the freedom to design and administer its own information technology (IT), either using in-house IT systems or by outsourcing the provision of such services to private contractors. The same goes for the freedom to determine appropriate capacity-building measures including effective use of a TAs' human resources (Crandall, 2010). In view of the above, it is evident that the level and extent of digital transformation strategy of TAs in LAC countries is predicated on their institutional structure as well as on their tax structure. Improvements in the provision of tax services via digital means cannot come alone but should be complemented by improvements in the core processes of the TAs if the current administrative structure allows for them. This means that investments in information and communication technology (ICT) will usually need to be backed up by a political commitment and willingness to implement the essential changes.¹⁴

Tax Framework¹⁵

Taxes levied in LAC countries may be divided into direct or indirect taxes and mostly fall into the broad categories of personal income taxes, corporate income taxes, consumption taxes, and wealth taxes. Some special taxes apply for specific transactions. Table 1.2 provides an

¹⁴ Similarly, according to Taliercio (2004), the factor that enables politicians to make their commitment credible is the level of autonomy given to the revenue authority, and politicians are interested in making a credible commitment because they believe it will increase tax compliance. This observation is confirmed by a survey conducted of large corporate taxpayers in Bolivia, Mexico, Peru, and Venezuela. The results show that perceived autonomy of TAs influences people's perceptions regarding political commitment to a potential reform. This further means that autonomy has merit in itself and not only as a means to achieve better performance of the TAs' functions. Because revenue performance depends on a variety of factors, both institutional and extrainstitutional, it is not possible to isolate the impact of autonomy itself on TAs' performance.

¹⁵ See Alink and van Kommer (2016). The taxes refer to information available as of 2015.

Table 1.2.**TAXES LEVIED IN LAC, BY COUNTRY AND TYPE OF TAX**

Country	Tax on income, profits, and capital gains	Tax on property	General consumption taxes	Excise taxes	Taxes on financial transactions	Taxes on foreign trade	SSC ^a
Argentina	x	x	x	x	x	x	x
Brazil	x	x	x	x	x	x	x
Chile	x	x	x	x			x
Colombia	x	x	x	x	x	x	x
Costa Rica	x	x	x	x			x
Dominican Republic	x	x	x	x	x		x
Guatemala	x	x	x	x		x	x
Mexico	x	x	x	x	x	x	x
Peru	x		x	x	x	x	x

Source: Based on Alink and van Kommer (2016).

^a Regarding social security contributions, see OECD (2021d).

overview of the main taxes levied in LAC countries based on the latest available information as published in the Handbook of Tax Administration.

As seen in Table 1.2, almost all LAC countries under examination levy income taxes, excise taxes, general consumption taxes (including VAT), and social security contributions while taxes on foreign trade, property, and special transactions are levied by the majority, except for Chile, Costa Rica, the Dominican Republic, Guatemala, and Peru. Thus, income taxes and VAT provide large contributions to the total tax revenue in all countries. This is more apparent in Table 1.3, which shows the percentage of revenue that each type of tax contributes to the GDP of each country.

Another result of the OECD revenue statistics study (OECD et al., 2021) is that the tax mix is influenced by the competence of federal or regional government bodies to levy the specific taxes. In LAC countries, tax revenues are mostly collected by central/federal entities while subnational public expenditures are to a large extent financed through transfers from upper to lower levels of government. An exception is Brazil where states and municipalities collect around 31 percent of total tax revenues, implying a high degree of decentralization in tax collection (i.e., large VAT revenues are collected by states, while in Argentina a significant collection at the state level is also observed notably due to the existence of provincial sales taxes) (OECD et al., 2021). In addition, subnational governments' own resources may be defined as

Table 1.3.**SHARE OF TAX TYPE AS A PERCENTAGE OF TOTAL REVENUE, BY TAX TYPE AND COUNTRY**

Country	Tax on income, profits	Social security	Payroll	Property	Goods and services	Other
Argentina	18.0	20.0	0.0	9.1	52.2	0.7
Brazil	22.4	25.7	1.8	4.6	42.8	2.7
Chile	34.8	7.3	0.0	5.4	53.1	-0.6
Colombia	32.3	9.5	1.7	9.1	42.9	4.4
Costa Rica	20.9	34.2	5.9	1.9	34.8	2.3
Dominican Republic	31.4	0.4	0.6	4.8	62.8	0.0
Guatemala	28.4	16.8	1.2	1.5	52.0	0.0
Mexico	44.0	13.4	2.5	2.0	36.4	1.7
Peru	36.5	12.1	0.1	2.4	47.2	1.7

Source: Table 4.4 in OECD et al. (2021).

those taxes over which these governments have tax jurisdiction—that is, the power to determine tax rates and the tax base on which the tax burden will be levied by law or constitution. In LAC countries the usual typology applied to levels of fiscal autonomy also covers the different tax-sharing and revenue-sharing arrangements that exist in the region in the light of the vertical asymmetries they entail.¹⁶ The authority that each governmental body possesses in terms of revenue collection and tax base determination is, however, different from the level of autonomy of the respective TA in regard to its tax administration functions.

The tax structure and the freedom LAC countries enjoy in designing their tax policies cannot be causally linked at first with the institutional autonomy TAs possess based on each organizational model. However, the institutional model may influence the effectiveness of each TA, thus influencing the tax policy design of tax structure, and may also inform future reforms.¹⁷

¹⁶ “Vertical” in this context refers to levels of government (national, regional, and local); see UN, ECLAC, and Agencia Española de Cooperación Internacional (2017). It should also be noted that intermediate governments have a relative level of fiscal autonomy with considerable vertical asymmetry. In the case of Chile, the study finds that 57.92 percent of tax revenues are redistributed by law, while the Municipal Revenue Act establishes limits and restrictions on distribution of other income.

¹⁷ Shome (1999, 17) states that although the framework of taxation rests in the enacted law, “it is the tax administrator who holds the reins over what part of the tax law is actually applied, what part is modified for the sake of practical simplicity or in order to achieve revenue goals under the revenue department’s

Peru is an example of a TA structure that has been influenced by fiscal and economic crises over the years. It illustrates how the collection of tax revenues and the overall efficiency of the TA in its tax functions is influenced by a combination of how the tax system is structured and how the TA is organized. Peru's strategy in view of fiscal challenges following the economic crisis in the 1980s involved the separation of the National Tax Administration Superintendency (Peruvian Tax Administration, or SUNAT for its name in Spanish) from the Ministry of Finance and the creation of an independent agency modeled on the Central Bank. The drivers of this reform were increased corruption and declines in tax revenue together with the TA's inability to recruit experienced professionals, pay good salaries, and provide appropriate training.

In light of the above, a radical reform had to be made, and it pioneered the concept of a semi-autonomous revenue authority—the first in Latin America. This reform was very successful as evidenced by the increase in tax revenues as a percentage of GDP but also by surveys documenting the public's perception about improvements in the provision of tax services. The institutional reform in Peru focused on granting SUNAT administrative and financial autonomy, thereby allowing for increased investments in personnel and ICT. Regarding personnel, the new structure allowed for the exemption of the TA's personnel from civil service salary caps. Moreover, SUNAT's superintendent was allowed to report directly to the president on important matters; lastly, the budget for SUNAT operations was funded directly from tax collections. These revenues were automatically deposited in its own accounts and were set at 2 percent of total collections. Importantly, it is argued that while establishing SUNAT can be seen as a success story to begin with, the same cannot be said of the subsequent developments that were marked by failure to maintain the ideal of such reform.¹⁸ Overall, Peru's experience highlights that providing institutional autonomy is only part of the reform's objective toward an efficient and modern TA and means nothing without more structural reforms and political support.

budget constraint, and what part is ignored since it is considered to be too impractical for field application...Thus, it often boils down to a matter of trade-offs between appropriate structure and effective administration, and the solution is to arrive at an optimal combination of the two."

¹⁸ Junquera-Varela et al. (2019, 13-14) analyze Peru's experience with institutional reform and argue that it can serve as a guideline for relevant reforms of other TAs in terms of both the positive and the negative lessons learned.

Chapter 2

Operational Tax Framework: Tax Functions and Services in LAC Countries

The core tasks of a tax administration (TA) concern the implementation and enforcement of tax legislation and regulations; thus, they have the power to administer taxes imposed by law. These activities include identification and registration of taxpayers, processing of tax returns and third-party information, examination of the completeness and correctness of tax returns, assessment of tax obligations, (enforced) collection of taxes, and provision of services to taxpayers.¹⁹ TAs need to develop effective organizational structures and be provided with adequate powers to implement and operate the tax systems they administer effectively and efficiently. Every TA needs an adequate level of autonomy that is reflected in its structure and operational responsibilities and is accountable for its operations. Moreover, the relationship

¹⁹ All these functions would fall under the general umbrella of the “tax compliance” that TAs must ensure. Tax compliance is a very broad term that covers most of the TAs’ functions. However, this document focuses on the first stage of tax compliance, which is service-oriented and refers to the transactional relationship between TAs and taxpayers, while the second stage is targeting TAs’ competence for tax collection and as such is TA-oriented. (This stage concerns mostly the audit mechanisms and procedures for tax enforcement.)

of TAs with taxpayers must be laid down in a system of rights and obligations. Most tax legislation has codified the governing relationship between taxpayers and TAs in order for both parties to be aware of and have easy access to their respective rights and obligations and the steps regulating each tax process. Codification, on the other hand, is not a prerequisite for the implementation of the substantive tax law on behalf of the TA; however, it greatly simplifies the work of tax officials, and it is thought to be in line with the principles of good tax policy (Thuronyi, 1996).

Framing Tax Services within the Tax Administration Environment²⁰

In relation to the digital transformation of TAs, there are differences between countries as to whether the new digital processes that are to be gradually integrated into the tax system are explicitly provided by tax legislation or are only implicitly allowed. Also, there are differences as to how the new technologies might affect the TA's implementation of the tax services while complying with the existing tax framework. These questions must be answered prior to introducing new methods of providing tax services as they relate broadly to the model of TA governance (Végh, 2018). In view of the above, the following chapter summarizes the main tax functions and services of TAs and how these services have been transformed by the implementation of digital technologies under or moving toward an e-government model.²¹ The core functions of a TA include the following, among others:

- Registration of taxpayers, including detection of non-registration and false registration
- Processing of tax returns, withholdings, and third-party information
- Verification or examination of the correctness and completeness of received information (including audit activities)
- Assessment of taxes due
- Process of enforced debt collection
- Handling of administrative appeals and complaints
- Provision of service and assistance to taxpayers

²⁰ The term “TA environment” refers to the general framework within which a TA interacts with taxpayers. This shapes their relationship and in turn impacts the obligations that TAs have by law to implement tax legislation that effectively leads to tax compliance. “Compliance” in this document is understood in its service-based dimension that enhances cooperation and examines the channels that TAs employ to provide services to taxpayers, especially digital channels as well as risk management in a preventive stage of managing tax compliance. See OECD (2004).

²¹ See Matteucci (2020), where the e-government phenomenon is characterized by increased sophistication, which is further realized in five stages: information, bidirectional communication, transaction, integration, and political participation.

- Detection and prosecution of tax fraud
- Imposing of penalties and interest payments

These tax administration functions are related to the taxpayers' main obligations or duties. That is, the services encompass a reciprocal or transactional element; they are addressed to taxpayers directly and aim to assist them in fulfilling their tax obligations. These services are essential to and sometimes precede the performance of the core function of TAs (i.e., tax collection enforcement). In all these services and functions, digital technologies have been incorporated to a greater or lesser degree depending on the digital maturity of each TA, its needs and priorities, and the digital knowledge of the administrative staff. In this analysis, the services relevant to the comparisons are further divided into two broad categories. On one hand are the tax services performed by electronic and digital means and falling within the core tax service function of tax administration (i.e., e-filing and pre-filing/e-assessment and, in turn, e-payments); on the other hand are services that concern the assistance provided to the taxpayer (consultation, information, notification before deadlines, and legal guidance, all of which have the potential to be carried out by electronic means or be fully automated). The classification of the services and functions of TAs is a pre-condition for evaluating their efficiency and effectiveness, part of which is benchmarking their performance in terms of digital maturity (see Chapter 5).

Overview of Benefits and Challenges from the Implementation of Digital Technologies in Tax Administration Services in General

ICT can improve the efficiency of the provision of tax services,²² enhance trust and certainty, and increase tax revenues.²³ The benefits from the use of ICT in TAs have been well docu-

²² Efficiency is increasing due to the large contribution of technologies that enable the storage and analysis of huge amounts of data that allow TAs to better manage the services they provide as well as improve resource management.

²³ This is accomplished through the reduction of administration and compliance costs. ICT will not necessarily increase tax revenues as such but, through the optimization of resources and efficiency in service managements, tax revenues are likely to increase. As pointed out by Bird (2010: 3), "countries exhibit a wide variety of tax compliance levels, reflecting not only the effectiveness of their TAs, but also taxpayer attitudes toward taxation and government in general. Attitudes affect intentions and intentions affect behavior. Attitudes are formed in a social context by such factors as the perceived level of evasion, the perceived fairness of the tax structure, its complexity and stability, how it is administered, the value attached to government activities, and the legitimacy of government. Government policies affecting any of these factors may influence taxpayer attitudes and hence the observed level of taxpayer compliance." The development of IT within TAs is one of those factors that can affect behavior and thus tax compliance, as more and more countries move in that direction.

mented by several jurisdictions.²⁴ On the other hand, challenges remain and are mostly related to the collection and use/management of data, the respect for due process and taxpayers' rights, budget constraints, and personnel shortcomings in digital skills.²⁵

In principle, due to the increasing use of digital communication systems, taxpayers are promptly informed about their tax obligations and their interaction with TAs is generally facilitated. Taxpayers save time and TAs significantly reduce the resources, such as staff time, taken to address queries through telephone services or tax offices. In addition, legal guidance through digital means is a new trend with significant potential but also with many challenges. For example, many tax jurisdictions have already started using social media platforms for their communication with taxpayers which, among other benefits, increases taxpayers' awareness about tax issues. Platforms such as Facebook, X, and YouTube allow TAs to reach younger generations of taxpayers, and revenue bodies can adapt to cultural changes to improve communication in the future.²⁶ Specifically, the Organisation for Economic Co-operation and Development (OECD) has endorsed the use of social media because it tends to effectively promote dialogue between TAs and taxpayers and also improves the image taxpayers have about the TA's function (OECD, 2011a).

A critical issue is how much information can be uploaded to TAs' websites and social media platforms and how much automated communication is feasible or desirable. A series of legal questions need to be answered here regarding the extent to which digital services provision is in line with the existing tax legal framework or whether changes need to be made immediately or in the near future when digitalization will prevail.²⁷ The experience of some indicative jurisdictions regarding the extent of the use of ICT in the provision of tax services²⁸

²⁴ See Chapter 2, where ICT has been an important indicator in measuring TA performance.

²⁵ Most of these constraints are also included in the indices used to assess the maturity of a TA (see Chapter 3).

²⁶ See Mickoleit's (2014) discussion of, among other topics, the importance of social media beyond simply improving communications. He highlights the potential of this channel to rebuild mutual trust between governments and their constituents and to improve government responsiveness to citizens, to promote taxpayers' inclusive and participatory access to government services, and to improve public service delivery.

²⁷ These issues are discussed in more detail in Chapter 6.

²⁸ The experience of the Australian Taxation Office (ATO) shows that the use of social media communication channels can become business as usual, but concern about security issues is the core obstacle for some administrations that therefore resist the use of social media. Risks of security breaches and privacy issues as well as misinformation are high. This suggests that automated communication and information provided on social media platforms must be managed by staff to mitigate those risks. Among LAC countries, Chile is making extensive use of social media for TA communication with taxpayers and the Secretariat of the Presidency has issued a code of conduct and checklists to guide incorporation of social media into agencies' communication strategies.

broadly suggests two approaches: On the one hand, implementation of ICT may occur within a general legal framework that enables the provision of digital tax services without providing further details on how such implementation can take place (i.e., the type of digital technology to apply or the level of automation that is allowed by law or legal standards); hence, countries proceed to an era of digital tax administration almost automatically. On the other hand, the level of digital maturity of each TA plays a significant role in defining the digital path to be followed—that is, the implementation of new digital means to provide tax services is fundamentally related to the level of maturity of each TA in general (as measured by broader performance and management indicators).²⁹

A last critical point that is intrinsically related to the decision of a revenue body to go digital (or more digital) in the provision of tax services is the question of whether it is more appropriate to build an in-house ICT function or outsource it to a private agent. The answer depends both on the institutional framework of a TA and its level of autonomy as well as its maturity level.³⁰ For example, some TAs that are internally integrated into the Ministry of Finance may not have an independent in-house ICT function and prefer to outsource it to the private sector in order to save costs. On the other hand, the main obstacle when outsourcing the ICT function is the security and confidentiality of tax information,³¹ which is fundamental to the way a TA is allowed to increase its level of digital maturity and depends largely on the tax legal and legal framework of each jurisdiction. To complete the framework of the analysis, now that the institutional and tax framework of LAC countries has been examined, we proceed to determining the digital maturity of TAs or tax services provided by different TAs in LAC countries. These digital maturity rankings will allow us to evaluate the current situation of LAC countries and offer recommendations.

²⁹ See Chapter 3 for more information. Outside LAC, Korea's Ministry of Security and Public Administration (MOPAS) has been responsible for designing a strategy on the use of social media under the general framework of the Government 3.0 Action Plan. Government 3.0 was the most important initiative to move the country towards e-governance, namely through improving government resources by setting up large data centers and integrating all information systems. It also enabled e-participation of citizens in the political process (assuming that, compared to the past, social media increased the possibility of two-sided cooperation between taxpayers and the TA and collective actions). See also Nurmandi et al. (2018) and Cho (undated).

³⁰ For a detailed analysis of the criteria that are relevant for making such a decision, see Chapter 3.

³¹ There are, however, ways to balance those risks if the costs of in-house ICT outweigh the benefits for a particular TA (see Chapter 7).

Maturity of Tax Administrations and Digital Maturity Models in LAC Countries

Digital maturity is distinct from general maturity, for which there are models to assess the efficiency of a tax administration (TA). While the general maturity of a TA reflects the efficiency with which it performs its functions and services, digital maturity is specific to digitalization of tax procedures and is measured according to different benchmarks that take into account the sophistication of the technology itself.³² (This can range from the most conventional technologies—e.g., web portals and online tax return filing—to more complex and advanced system implementation, such as advanced analytics for taxpayer risk profiling and blockchain applications.)

The term “digital maturity” as used in this document refers not only to the available technological tools but also more broadly to the combination of available technologies and integrated systems that yields the most appropriate resource allocation to achieve each of the TA’s goals.³³ It therefore has a dual meaning: it refers to the maturity of TAs based on

³² “Sophistication” refers not to a type of technology per se but rather the capabilities of a technology.

³³ Similarly, this view is focusing on the result that each TA aims to achieve by the use of information and communication technology (ICT) and not on the ICT as such.

the technological resources available and the complexity of tasks performed, and it also considers maturity in terms of the efficiency of digital tax service provision based on a combination of digital tools, irrespective of their individual levels of sophistication. In both cases, this approach assumes that the best tool is the one that is most effective for achieving the TA's aims when digitalizing a tax service or process.

The framework for assessing the suitability of a technological-digital strategy involves comparing the potential outcomes and risks of certain technologies with the desired objectives. The latter can be further divided into three categories: revenue collection, taxpayer satisfaction, and resource allocation. Measurement of taxpayer satisfaction and revenue collection efficiency requires specific data from each country (including the operational context in each country). As these data are not uniformly available in the countries studied in this document, the evaluation carried out here is limited to identifying the strength of the relationship or causal links between the use of certain technologies (or combination thereof) and the attainment of specific outcomes. This evaluation across countries is only feasible, however, where objective measures are used that ensure comparability between different TAs and their respective countries. In fact, differences between the operational frameworks in each country mean that measurement of each country's relative digital maturity is hard to assess, thus hindering cross-country comparisons.³⁴ Accordingly, the results of this examination can only approximate an evaluation of best practices and thus only provide broad guidelines for achievement of specific objective outcomes.

Overview of General Maturity Models and Related Benchmarks

The existing work carried out by several international organizations to establish either general or digital maturity models and related benchmarks for TAs is highly instructive.³⁵ We treat general maturity models and their related benchmarks in this chapter and digital maturity models in the next.

With respect to general maturity benchmarks, for example, the United States Agency for International Development (USAID) has produced a model to assess the general level of maturity of the TA in a given country by using a human and institutional capacity development (HICD) approach with specific application to tax administration (Jacobs et al., 2013). The columns of Table 3.1 summarize the four levels of maturity (from low [ad hoc]

³⁴ On the diversity of TAs and the implications for benchmarking, see also EUROSAT (2008).

³⁵ See the European Union's Fiscal Blueprints (European Commission, 2007); the Tax Administration Diagnostic Assessment Tool (TADAT) developed by the IMF, the World Bank, and various national governments; or the World Bank's Integrated Assessment Model for Tax Administration (IAMTAX).

Table 3.1.**USAID MODEL OF GENERAL MATURITY**

TA areas affected	Levels of Maturity			
	Ad hoc	Formalized	Integrated	Strategic
Operations	Operations are informal, sporadic, and ever-changing.	Operations are formalized, evidenced by regular practice or documentation.	Policies, programs, processes, and tools are consistent.	Organizational strategy and performance goals filter through all levels.
Stakeholders	Stakeholders have different levels of understanding and awareness, and their commitment is variable.	Stakeholders have a shared understanding, but programs may not be coordinated.	Cross-functional ownership and information sharing promote integrated programs and operations.	Stakeholders engage in behavior that directly supports desired outcomes.

Source: Jacobs et al. (2013).

to high [strategic]), while the rows depict the two areas affected (operations and stakeholders) and the cells contain the criteria or parameters used to measure progress. This model is used by USAID to assess the maturity of TAs in Latin American and Caribbean (LAC) countries at a general level, and it does not categorize individual countries by levels of maturity.

The USAID maturity model represents a broad assessment that should be supplemented by additional criteria when evaluating specific tax administration processes. For example, if a TA needs to evaluate its registration, audit, collection, or information technology (IT) services, additional parameters should be included in the above cells that are relevant to those processes. A useful way to build a maturity model is to provide a scoring mechanism that assigns scores to TA capacity and contains additional quantitative benchmarks for each characteristic.³⁶

Based on this model, USAID classifies TAs into those that are “unaware” (maturity level 1), “awakening” (maturity level 2), “poised” (maturity level 3), and “solid” (maturity level 4).³⁷

³⁶ This is the main feature of maturity models developed by international organizations and private companies. For the analysis of tax function effectiveness in the tax departments of private organizations, see Kuijper, Cameron, and Szatmari (2020), which divides the level of effectiveness into four clusters ranging from tactical to strategic (reactive, proactive, progressive, and “best in class”) and assesses effectiveness in light of tax reporting and filing obligations and disclosure requirements related to base erosion and profit shifting (BEPS).

³⁷ Again, while individual countries cannot be classified by level of maturity using the criteria in Table 3.1, they can be classified using the “criteria for clustering” displayed in Table 3.2.

The criteria applied for this classification are summarized in Table 3.2. Only criteria that are relevant to tax services and are useful for assessing tax service maturity levels in LAC countries are listed. These criteria are aside from any digital implementation strategy that the TA may be carrying out. However, the level or nature of a TA's IT systems implementation is also an important factor in gauging whether the TA is at a mature stage of development.

The USAID classification of general TA maturity links the implementation of procedures and tax operations to the relationship between TAs and taxpayers, as well as to the relationship between TAs and the private sector and how open the TA is to applying digital processes and modern technologies already in place elsewhere. The model is focused on the efficiency of the tax function, as evidenced by how well the TA's operations are organized around the aims of tax collection, taxpayer trust in the TA, and openness to developing future-oriented strategies. Thus, those TAs with the highest levels of general maturity (levels 3 and 4) have reliable tax registries for monitoring tax compliance, make provision for self-assessment, and explain tax obligations to taxpayers through procedural guidance that is regularly and electronically updated. Meanwhile, TAs that lag but are slowly starting to embrace new strategies have the lowest levels of maturity (levels 1 and 2). As far as the level of digitalization is concerned, however, this model assumes only that the use of modern technologies reflects a generally high level of maturity (Jacobs et al., 2013).³⁸

Another important parameter used to assess the maturity level of a TA is a legal framework that supports advancements in the TA's performance of services and flexibility to adapt to technological changes. The level of maturity of a TA will depend on whether the legal framework is modern, easy to understand, and codified or whether there is specific legislation in place allowing for the use of electronic and digital means in the performance of the TA's functions.

It needs to be stressed that in order to cluster TAs based on their maturity level, data availability is crucial. If, for example, there is a lack of data for one category of factors needed for classifying the TA, this deficiency would also affect the classification of other areas of the TA's functions. This conundrum confirms the difficulty of objectively classifying the maturity of a single TA, let alone of classifying TAs in different tax jurisdictions. This is why most of the recent maturity models that tend to focus on the digitalization of TAs assess digital maturity of very specific tax services or processes by first establishing the criteria of the best practice and then assessing each tax service in light of that ideal. This approach provides more reliable results, as it is more accurate at the level of an individual tax service or process evaluation, but these partial results cannot be used for assessing the TAs' performance as a whole by way of extrapolating from the level of digitalization of certain tax functions.

³⁸ TAs at the third level of maturity have started to embrace many of the technological advances used in the private sector, such as e-commerce, interactive telephone systems, and the capture of data by the scanning or imaging of paper documents.

Table 3.2.**USAID CRITERIA FOR ASSESSING THE MATURITY LEVEL OF TAX ADMINISTRATIONS**

Characterization of TA maturity level	Criteria for clustering
Unaware	<ul style="list-style-type: none"> • Inaccurate taxpayer registries and accounts. • No provisions for self-assessment. • Service to taxpayers is largely nonexistent. • Mutual hostility between TAs and taxpayers. • Little modern technology or equipment is available. • Most work and information systems are manual. • Lack of legal/regulatory institutions, modern tax policy, civil service rules and regulations for attracting and retaining qualified staff, international accounting and professional standards, and modern financial and banking standards and institutions.
Awakening	<ul style="list-style-type: none"> • Formal registration of taxpayers but usually with unreliable tax identification numbers (TINs). • No provisions for self-assessment; TAs begin to seek legal changes to advance self-assessment and voluntary compliance. • Taxpayer service programs have been established but are disorganized and understaffed, with erratic levels of competence among the existing staff. • Little modern technology or equipment is available; most of the work is still done manually. • Lack of legal/regulatory institutions, modern tax policy, civil service rules and regulations for attracting and retaining qualified staff, international accounting and professional standards, and modern financial and banking standards and institutions.
Poised	<ul style="list-style-type: none"> • Provisions for self-assessment, with limited opportunities for corruption and an estimated 70–75 percent voluntary compliance level. • Formal registration of taxpayers with a “best-practice” system of TINs and accurate taxpayer accounts. • Identification of large taxpayers, but TAs still have a partial grasp of the size of the informal economy and non-filer population. • TAs have greater focus on short- and medium-term objectives, with a lack of focus on long-term direction. • Procedural and policy manuals have been developed for each of the TA functions and are closely followed by skilled staff, but the manuals suffer from a lack of timely updates. • Modern technology and equipment are available, but there is often a shortage in specific departments, and funds for purchase are often limited. • Presence of legal/regulatory institutions, modern tax policy, civil service rules and regulations for attracting and retaining qualified staff, international accounting and professional standards, and modern financial and banking standards and institutions. • Use of technological advances used in the private sector such as e-commerce, interactive telephone systems, and the capture of data through the scanning or imaging of paper documents.
Solid	<ul style="list-style-type: none"> • Provisions for self-assessment have existed for several years; at least 85 percent of taxpayers comply voluntarily. • Incidences of corruption within the TA are extremely rare. • Registration of taxpayers has been tested over several years and proven to be very accurate, and taxpayer accounts are rarely inaccurate. • Strategic plans, with a clear focus on the long-term objectives of the organization. • Clear, concise procedural and policy manuals are available electronically for each of the TA functions, closely followed by skilled staff, and updated electronically. • Reliable information systems supported by the latest technological advances used in the private sector such as e-commerce, interactive telephone systems, and the capture of data through the scanning or imaging of paper documents.

As noted earlier, a more specific parameter for assessing the maturity of TAs is the legal framework. Following the above criteria for maturity categorization, USAID and the Inter-American Center of Tax Administrations (CIAT) classify under maturity level 2 the TAs of countries such as Costa Rica, Guatemala,³⁹ and the Dominican Republic⁴⁰ by reference to the maturity of their legal framework, which is based on how modern, comprehensible, and up to date the tax legislation is. On the other hand, for Argentina, Brazil, Chile, Colombia, Mexico, and Peru, whose TAs are more “sophisticated,” the legal framework is more up to date with technological developments and hence their TAs are scored higher in that respect. This is because the principle of self-assessment is usually established in the law; legislation allows banks to receive tax returns and payments; and e-filing and electronic signatures are already in place albeit optional in some cases. However, there is still a lack of explicit provisions requiring banks or other third parties to regularly provide information on payments to taxpayers to the TA for matching with their files (IDB, 2013). This can be identified as a red flag issue for further improvement.

Digital Maturity Models

As already noted, the concepts of institutional and legal maturity are distinct from that of digital maturity. Measuring digital maturity involves different criteria that add another level to the model for assessing TA maturity. In some cases, however, digital maturity mirrors the level of operational and legal maturity, meaning that countries with lower levels of the latter are likely to have lower digital maturity level as well. Several organizations have developed ad hoc models for assessing the digital maturity of specific TAs.

The IDB Digital Maturity Model

The Inter-American Development Bank (IDB), CIAT, and the Organisation for Economic Co-operation and Development (OECD) have each developed a set of criteria in recent

³⁹ Guatemala, among other countries, has negotiated contracts with commercial banks and developed software for processing payments that they provide to the banks free of charge. Under this arrangement, commercial banks receive and process tax declarations, together with payments, and provide taxpayers with receipts for tax declarations and payments received; see Gallagher and Jacobs (2009). In general, though, maturity level 2 under the above USAID model indicates a low use of technological equipment and lack of legal provisions for the use of banks for receipt of tax returns and payments. All payments are usually made at the separate TA cashiers’ offices. In addition, provisions for e-filing and electronic signatures do not exist in the laws despite the existence of some locally initiated relevant projects.

⁴⁰ See also the tax code model drafted by CIAT to assist LAC countries with a low level of maturity in improving their current legal frameworks (CIAT, GIZ, and IDB, 2015; IDB, 2013).

years that has made it possible to identify and document best practices in the use of technology and information processes for tax collection. The IDB prepared a digital maturity model using the Chilean TA as a case study in order to determine its level of digital maturity in the services offered to taxpayers; there are plans to extend the model to Colombia, the Dominican Republic, and Guatemala (Collosa, 2021; Reyes-Tagle, Santin, and Cadena, 2021). As a starting point, the IDB model considers how information is managed by TAs: (i) the information is entered into the system only once, (ii) the information is processed in a centralized way, (iii) the information is received and recorded in a paperless fashion, and (iv) the information is received and processed on a real-time basis (Reyes-Tagle, Santin, and Cadena, 2021). Under these general criteria or guideline principles, the IDB establishes four indicators to determine the maturity level of a TA regarding each dimension or parameter that the model considers necessary for the provision of a digital service. These are: (i) digital environment, (ii) digital transformation of resources, (iii) data management, and (iv) digital products and services. Each of these components are in turn scored from 1 to 4 in order to determine a digital maturity level as follows:

- Level 1: Incipient (or Discovery)
- Level 2: Intermediate (or Transitioning)
- Level 3: Advanced (or Achieving)
- Level 4: Best practices (or Leading)

Within each digital maturity indicator there are sub-indicators that are also scored to determine the final score for each indicator according to the average of the sub-indicators; then the average of the sum of the four indicators determines the maturity level of each dimension set for each TA.

The first indicator concerning *digital environment* encompasses the following sub-indicators: national digital policy, internet accessibility level, e-government policies, leadership in the digitalization of the public sector, and digital identity. This indicator has as its starting point the acknowledgment of the role that TAs play in the digitalization of the government as a whole and the influence that they have in the economy of a country.

The second indicator is *digital transformation of resources*, and it encompasses governance, human resources, funding and hiring policies, and strategic planning. These resources allow the TA to provide e-services to the taxpayers according to the information that it has at its disposal. These services include pre-populated tax returns and electronic communications with taxpayers.

The third indicator is *data management*, and it includes data policies; control over the quality of the data; safeguards for the data; taxpayers' registry, e-invoice, filing, and

payment; and other information sources.⁴¹ This indicator deals with the acquisition of the data needed to provide services and also with the processing of such data to effectively provide such services.

Finally, the fourth indicator is *digital products and services*; it deals with management indicators, taxpayer monitoring, availability of a web portal for tax services provision, pre-populated tax returns, and compliance control.

The IDB's digital maturity model has been further developed by the inclusion of additional sub-indicators and is aimed at assessing every dimension of the digital tax service environment. Once all dimensions are assessed, a final score is computed based on the average for the maturity of the TA as a whole.

Table 3.3 and Figure 3.1 summarize the IDB digital maturity model as applied to the Chilean case; the methodology can have a broader application for assessing the digital maturity of TAs in other LAC countries as well.

The CIAT Digital Maturity Model

The model developed by CIAT assesses the maturity level of automation of the functions available for each tax type and not the TA's organizational model as a whole (CIAT, 2020). Four levels of automation are identified: "Level 1: There is no automation; Level 2: There is a preliminary automation level, with the primary focus on digitalizing the data after completing the transaction; Level 3: This level is mainly focused on automating the transactions internally, with or without minimum interface with the taxpayers. Only the tax agency staff has access to the system; Level 4: An advanced automation level where the services and functions related to the tax administration are automated with the taxpayers' interaction. There are also provisions for the exchange of data with other external interested parties such as banks" (CIAT, 2020, 356).

The classification of TAs' digital maturity based on the level of automation resembles the classification made with the IDB model, according to which each level of maturity is determined by the way information is managed. If we accept that information is entering the system and then is processed in different ways depending on the technologies used, then the above two models could have similar underlying methods to assess digital maturity such that the levels of digital maturity identified by each model could match. In other words, if

⁴¹ This last sub-indicator refers to the availability of information stemming from other sources such as financial institutions. In the case of Chile, for example, the banking secrecy law is still in place, which impedes the TA from retrieving relevant information. In this specific sub-indicator, Chile scores 1 (Incipient level). However, one could still identify scope for improvement that may come, for example, not from the implementation of a new technology but from the reform of the respective legislation in order to adjust to the new digital reality.

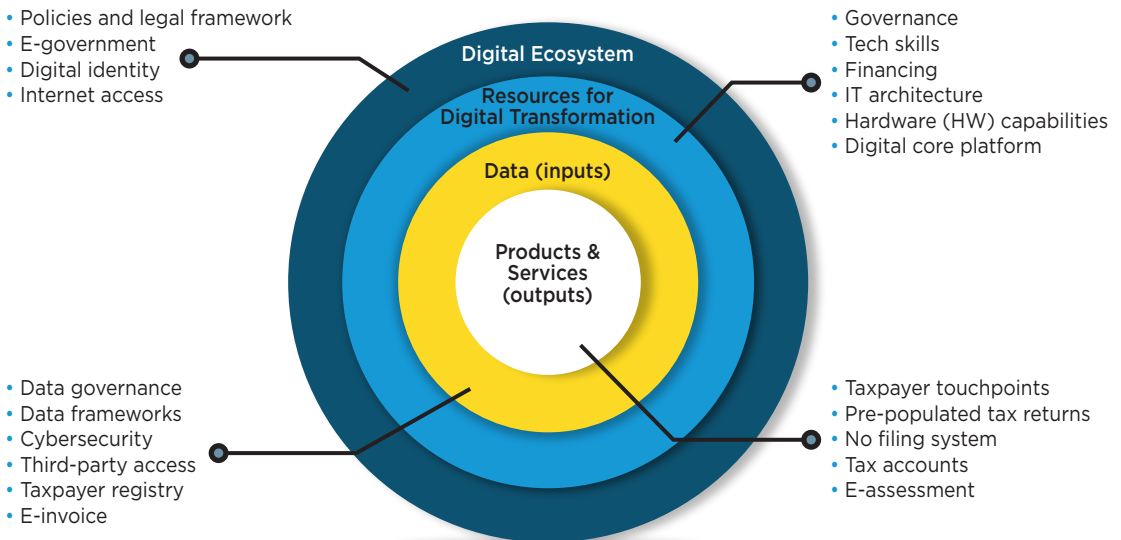
Table 3.3.

IDB DIGITAL MATURITY MODEL

Maturity level on a score of 1 to 4	Parameters for clustering	Indicators and sub-indicators scored
1. Incipient/Discovery 2. Intermediate/Transitioning 3. Advanced/Achieving 4. Best practices/Leading	1. Information is entered into the system only once. 2. Information is processed in a centralized way. 3. Information is received and recorded in a paperless fashion. 4. Information is received and processed in real time.	1. Digital environment a. national digital policy b. internet accessibility level c. e-government policies d. leadership in the digitalization of the public sector e. digital identity 2. Digital transformation of resources a. governance b. human resources c. funding and hiring policies d. strategic planning e. data management f. data policies g. control over the quality of the data h. safeguards for the data i. taxpayers' registry, e-invoice, filing, payment j. other information sources 3. Digital products and services a. management indicators b. taxpayer monitoring c. web portal for tax services provision d. pre-populated tax returns e. compliance control

Figure 3.1.

THE IDB DIGITAL MATURITY MODEL



information is simply entering into the system, there is no “automation” yet and the TA is still at Level 1. If information is only processed in a centralized way, it can be assumed that automation is exclusive to the digitalization of data (i.e., is used for collecting, cleaning, and assessing data that is relevant), which matches Level 2 of both maturity models. If there is further processing of information resulting in paperless management, the level of automation comes closer to what integration achieves by collecting and managing data that are already in the system from different sources. This requires a minimum interface and is mostly used for internal tax processes (Level 3). However, if information is received and processed in real time or as close as possible to real time, this implies a digital system in place that allows the cooperation of both TAs and taxpayers and implies further integration (Level 4). At this stage tax compliance is fully integrated with taxpayer operations and third parties.

This evaluation is by no means conclusive because assessing the digital maturity of a TA is a multidimensional project. To evaluate the digital maturity of the organizational structure of the TA, it is necessary to identify further factors that have to do with TA’s preparedness to implement modern information and communication technology (ICT). These factors include, among others, legal constraints and the possibility of data exchange between TAs and other entities and institutions that may facilitate the digital performance of services (CIAT, 2020). This means that despite the readiness of a country or a TA as an institution to modernize its services, the legal framework may pose obstacles that would lead to the TA placing lower in the maturity ranking.

The OECD Forum on Tax Administration's Digital Maturity Model

The OECD has recently prepared its own maturity models for TAs that allow TAs to assess their maturity level either regarding their organization or their strategic performance. These models operate by describing broadly the capabilities of TAs and the relevant service performance across different identified maturity levels. This means that the models are largely based on processes and outcomes rather than metrics.⁴² Specifically, even though these models may identify an undesired outcome, they do not provide further information on how a better outcome could be achieved nor on the sustainability of the solution. Sustainability is a key principle in building maturity models according to which TAs may improve their services, as it is based on the concept of continuity and dynamic evaluation of digital tools and tax processes.

The OECD Forum on Tax Administration (FTA) first developed its digital maturity model in 2016 for the areas of natural systems/portals and big data (OECD, 2016b);⁴³ in 2018 it

⁴² This approach is similar to our proposed teleological approach to maturity models.

⁴³ In fact, data are intrinsic to all digital maturity models as they are the raw material of all digital technologies that each TA may use.

went further to create a set of standalone maturity models covering a broad range of TAs' functions (auditing and human resource management, enterprise risk management, analytics and measurement, and minimization of compliance burdens) (OECD, 2019c, 2019d, 2020c, 2021b). The design of these models was used as an initial reference system for the so-called "middle" or "established" level, which provides for determining the average digital maturity of TAs. Around this average level the other levels of maturity were identified. The lower level was named "emerging" and the higher level "aspirational." The latter is also used to describe what might be possible in the future but does not provide any indication on the optimal level of digital maturity as this is largely country specific and there is no one-size-fits-all solution.⁴⁴

Summary and Convergence of the Various Digital Maturity Models

These digital maturity models serve as guidance to TAs for classifying their maturity and preparing a strategy for improvement. In this regard, comparison of different TAs according to their relative level of maturity is an additional very useful tool for designing that strategy.⁴⁵ The CIAT digital maturity model is based on verification of the TA's functional and service coverage in addition to the level of automation, according to a series of key characteristics. This model also allows for conclusions as to the readiness of a TA to move to a higher level of digital maturity. It is noted that if the functional coverage of the existing tax integrated system is high then the tax agency will be better prepared to adopt a more sophisticated system.⁴⁶ For this reason, the level of automation is used for evaluating the readiness for migrating from one level to another, which further means that automation itself is a reasonable benchmark of digital maturity. The more advanced or complex the relevant algorithms are, the more sophisticated a system is, and the better data are processed. The level of automation could be quite a comprehensive index around which to evaluate the maturity of a TA, particularly if it incorporates as sub-indices the preparedness of TAs to automate given the legal constraints identified above. More specifically, an index including both technological readiness and legal or

⁴⁴ See also FTS of Russia and Forum on Tax Administration (2017), which assesses digital maturity of the online tools and services offered by TAs by looking at the availability of online information, security of digital transactions, segmentation, and personalization in delivering end-to-end digital services. The levels of digital maturity are then classified as follows: Level 1 (Nascent), 2 (Emerging), 3 (Adoption), 4 (Advanced), 5 (Leading Practice).

⁴⁵ This is why comparisons are made in this document between different countries with the aim of implementing best practices.

⁴⁶ There is high likelihood that broader functional coverage implies higher level of automation; hence, the TAs that meet these conditions are classified as more digitally mature (or Level 4 in each maturity model).

functional readiness of a TA to adopt a digital solution is more illustrative for the purposes of mapping the existing situation and informing future actions.

On the other hand, the IDB digital maturity model is more specific and matches the level of maturity to specific digital tax services that, although automated to some extent, fall under the more specific indicators set by the model regarding the overall data management policy. The OECD FTA digital maturity model follows a similar logic. A data-driven tax administration policy and the application of certain technologies that implement such policies (i.e., technologies for e-invoicing, pre-populated tax returns, or transaction-based tax accounts) together with a strategy to provide taxpayer-oriented tax services comprise the main axis around which the digital maturity of TAs is examined. At the same time the OECD's framework provides the ideal according to which every TA's tax services may be evaluated.

Most international organizations currently measure digital maturity using a broad evaluation framework with four levels, assessing (a) what systems are in place that allow access to online tools for tax services provision, (b) whether data are simply entering a system or are further processed, (c) whether in the above process the tax result is automated merely for internal purposes with low taxpayer interaction or there is more advanced real-time data collection and processing that includes real-time cooperation of taxpayers with TAs, and (d) whether there is a relevant legal framework in place that authorizes the system to operate (CIAT, 2020; OECD, 2011b). We conclude that we could use the general idea that appears to be common to all of these models to assess the digital maturity of LAC countries following the four levels of digital maturity as identified by IDB and CIAT, namely the level of information management or automation. As Level 1 may not be applicable since most of the countries are currently expected to provide for at least a basic electronic service of tax filing subject to certain exceptions, we could either start our classification of LAC countries from Level 2 of the IDB/CIAT maturity index or we could merge Levels 1 and 2 of the IDB/CIAT maturity index so there are just three levels of maturity or three tiers of countries. This adjustment allows our classification to focus more on the general idea of the maturity models rather than attempt a very specific categorization of the countries to be examined. This fits the purpose of this document, which is to offer high-level guidance for LAC countries to both assess their digital maturity in view of the criteria identified and to learn from other countries in the region or outside the region about how they could advance their digitalization and performance in general.

Matching Digital Maturity with Specific Tax Services (E-Tax Services)

Before attempting to assign digital maturity levels to the LAC countries examined, it is useful to clarify what is meant by tax services and what is included in tax services within the whole nexus of tax functions of a TA. This will form the basis of the comparisons below. A list of

TA functions includes services and resources such as a tax calendar; application forms; documents containing the relevant legislation; online applications for tax identification number (TIN) registration; online verification of information utilizing original data sources and third parties; issuance of certificates, self-assessment of tax liability, and generation of tax returns (pre-filing of tax returns); electronic payment of taxes at banks and others financial institutions; integration of taxpayers' accounts; and auto-generation of reminders and assessment notices for non-payment and erroneous payment. Some of these services are analyzed further for specific LAC jurisdictions (see Chapter 4) to determine if there is appropriate infrastructure or framework available to enable these and other relevant services to be performed online from the outset of the process.

For example, additional factors to be taken into account within this context are the availability of web services to accept electronic invoices, electronic withholding certificates, and other fiscal documents; to query the compliance status of taxpayers by authorized parties (such as government agencies when verifying taxpayer eligibility to participate in procurement processes) and informing the TA accordingly; or to inform the taxpayer that an audit process has been initiated (ADB, 2014).

The above functions constitute the core of the tax administration procedures required to prepare the documentation of payment of the tax due, starting with the collection of data and the generation of a tax return through the calculation of deadlines for the tax return, the verification of information, and the tax payment. Therefore, these processes create a whole ecosystem around the provision of tax services that is fully or partly digitalized.⁴⁷ In addition, part of the TA's competence extends to the quasi-judicial procedure that identifies errors in tax payments resulting either from non-filing or from erroneous filing and payment. This competence is attributed to TAs so that they may correct any error in any given tax administration procedure prior to the initiation of a judicial process. It also enhances the efficiency of tax administration, creates trust between taxpayers and TAs, and increases legal certainty. Automation can greatly facilitate these functions of preparation and issuance of assessment notices, e-filing of appeals, and even e-management of arrears of collection processes such as issuing alerts and notices for seizure.

The level of automation in conjunction with the efficacious provision of services is a proxy that can be used to compare the efficiency and effectiveness of services' performance between different TAs. However, more information is needed to assess whether automation, depending on the nature of data analysis and data policy, equates to higher digital maturity and whether this further translates into better services for both taxpayers and TAs. This additional information may consist of the type of technologies used, the intention of their

⁴⁷ It also includes the management of refunds and the online submission of application for tax clearance certificates.

implementation, and the result of a comparison of before and after the implementation of any technology in terms of its effects on revenue collection or taxpayer satisfaction. In fact, the true motivation behind the implementation of a TIS depends on the objectives of each jurisdiction. For example, the focus of a tax agency having poor revenue collection efficiency will be different from the tax agency focusing on improving its resource allocation and internal management. When considering how automation or digital information management can assist the various tax agencies, the solution needs to be customized according to each TA's priorities. To this end, statistical information is often useful, especially as far as the type of taxes and the users is concerned. This information may assist in classifying countries' current level of automation (and its potential) based on the available transactional data, the extent to which each tax contributes to revenue raising, taxpayer size in terms of their income or wealth, etc.

Digitalization of tax administration services in principle tends to emphasize the collection of data for accurately determining taxpayers' tax liability and securing collection. In Table 3.4 the digital profiles of national TAs are grouped into five levels based on research carried out by EY (2017).

From Table 3.4 it is easy to see that the identified levels of TAs' digital profiles utilize similar parameters as those of the digital maturity models described above. Simplistically, we could say that EY's Level 1 corresponds to a simple online tax filing service as in the IDB/CIAT model; Level 2 requires more data processing, accounting records, and matching (similar to Level 2 of IDB/CIAT on low level of automation and central process of information), Level 3

Table 3.4.

EY'S FIVE LEVELS OF TA DIGITAL PROFILES

(1) E-File	(2) E-Accounting	(3) E-Match	(4) E-Audit	(5) E-Assess
Use of standardized electronic forms for filing tax returns required or optional; other income data (e.g., payroll and financial) filed electronically and matched annually	Submission of accounting or other source data to support filings (e.g., invoices and trial balances) in a defined electronic format according to a defined timetable, frequent additions and changes at this level	Submission of additional accounting and source data; government accesses additional data (bank statements) and begins to match data across tax types, and potentially across taxpayers and jurisdictions, in real time	Level-2 data analyzed by government entities and cross-checked with filings in real time to map the geographic economic ecosystem; taxpayers receiving electronic audit assessments with limited time to respond	Government entities using submitted data to assess tax without the need for tax forms; taxpayers allowed a limited time to audit and correct government-calculated tax payments due

Source: EY (2017).

requires communication with other agencies (similar to Level 3 of IDB/CIAT model requiring processing of information resulting in a paperless fashion of management, use of minimum interface), and Level 4 requires full real-time information collection and processing which equates to full automation of the tax service and implies further integration (similar to Level 4 of IDB/CIAT).

Consolidating the indicators derived from the previously described digital maturity models into general levels of maturity based on comparable indexes allows us first to classify certain electronic tax services according to the levels identified by these maturity models and second to assess which of the mentioned e-tax services are rendered by which LAC countries. This exercise will enable the classification of TAs' digital maturity in LAC countries based on a combination of the benchmarks identified above and grouped according to the respective level of maturity and following the same logic. As the purpose of our study is to evaluate the ability of each LAC country to improve its digital maturity, we first assess the current situation of tax services in each one. Next, we classify these countries based on the three or four levels of digital maturity indicated above (1: incipient/discovery, 2: intermediate/transitioning, 3: advanced/achieving, and 4: best practices/leading; Levels 1 and 2 are likely to be merged). Third, we complement each country's classification by introducing red flags that highlight those that can move to a different level and specify the related constraints or modifications to the move. To this end, we further assess the sophistication of technologies already in use and the possibility to go more digital as well as the feasibility of implementation of a digital strategy and what that would include (i. e., not merely the provision of electronic services but the tailoring of the implementation of each technology to a specific tax goal or organizational milestone). Part of the digital strategy is not simply the implementation of new technologies to ease the compliance of tax obligations by taxpayers, but also the establishment of an appropriate legal framework to align the digitalization process with the normative tax framework and the rule of law that govern the power to tax.

As stated previously, these tiers are indicative of the digital maturity level of the TAs and within each tier are further differences that one can observe if each maturity level is strictly assessed by the IDB/CIAT digital maturity models. Likewise, there may be TAs with strengths and weaknesses not found in other TAs and vice versa, irrespective of the proposed general classification. For these reasons, the classification made in this document (see Table 3.5.) is illustrative of the current situation of the digital maturity level of TAs in selected LAC countries and may be used as a reference when developing proposals for further improvement.

Table 3.5.**PROPOSED FRAMEWORK FOR ASSESSING LAC COUNTRIES' DIGITAL MATURITY FOLLOWING THE DIGITAL MATURITY INDEXES OF IDB AND CIAT**

LAC countries' classification based on digital maturity levels	Parameters of classification	Indicative e-tax services per maturity level
Tier 1: Best Practices	<ul style="list-style-type: none"> • Use of sophisticated automation technologies that result in full automation of tax services and are based on TA-taxpayer interaction (real-time tax compliance) • Communication of data with third parties • Clear focus on efficiency of both internal organization and external services provision (intentional aspect) • Enactment of required legislation that enables digital transformation 	<ul style="list-style-type: none"> • Digital identity technologies (e-registry) • Pre-populated tax returns • Data analytics • E-invoicing • E-assessment including cases of e-payment • E-communication and automated tax guidance
Tier 2: Intermediate-Advanced	<ul style="list-style-type: none"> • Various digital solutions already in place—automation usage mainly for internal processes—limited use of third-party data, limited ability for real-time tax compliance • Clear focus on efficiency of internal organization • Some legislative reforms in place or under enactment (i.e., bank regulations regarding e-payments) • Communication with other public or private agencies for data exchange 	<ul style="list-style-type: none"> • Electronic filing and limited cases of pre-populated tax returns • Limited e-registry • E-invoicing but limited option for integrated tax accounts • E-communication but not automated tax guidance (online apps available for tax reporting and information)
Tier 3: Low	<ul style="list-style-type: none"> • Important steps in digitalization process are taken but are not enough (online communication and filing exist for some taxes but not everywhere) • Awareness of need for efficiency of internal organization • Infrastructure and HR constraints limit digitalization opportunities • Legislation is not adopted 	<ul style="list-style-type: none"> • Online filing (limited availability of pre-populated tax returns) • Registration mostly in person • Electronic tax payments • Web portal communication systems and mobile apps

Chapter 4

E-Tax Services in LAC Countries: The Current Situation

This chapter summarizes the current situation of e-services provided by tax administrations (TAs) in eight Latin American countries and provides an overview of those in the Caribbean. These countries represent an indicative sample of countries ranging over the previously described scale of digital maturity. The analysis starts with a preliminary categorization of the countries in terms of the digital maturity level of the tax services they provide, followed by a more elaborate analysis of the reasons for such a categorization considering the relevant digital maturity framework. We observe that the TAs of the representative jurisdictions in Latin American and Caribbean (LAC) countries exhibit diverse levels of digital maturity. Chapter 5 offers a classification of the countries compared in Latin America into tiers based on our results from the horizontal (cross-country) comparison of the provisions of their tax services.

Brazil

Among all the TAs in the LAC region, the Brazilian Tax Administration (RFB for its name in Portuguese) is considered to be one of the most advanced in providing digital services for its taxpayers (CIAT, 2020). The RFB makes use of a web portal and mobile applications to

provide services to taxpayers in a more effective fashion.⁴⁸ The use of these communication channels permits the RFB to provide an array of services such as registration of the taxpayer, preparation and filing of tax returns, access to tax-related information, requests for refunds, etc. In addition, communication between tax authorities and taxpayers is made via an electronic inbox or online real-time chats with a TA agent or an automated tax assistant. Some of the services provided by the RFB are embedded (or invisible), leveraging off the daily activities of taxpayers (OECD, 2014).⁴⁹

Taxpayers have access to an online portal to deal with all their tax obligations, the E-CAC (Centro de Atendimento Virtual ao Contribuinte da Receita Federal or Tax Administration Center for Virtual Assistance to Taxpayers), which permits taxpayers to interact with the TA, review their tax situation including the history of tax returns and debts, conduct payments, learn about the applicable rules, request refunds, etc. Via this portal taxpayers can also reach the TA directly through the online chat or schedule an appointment at the RFB (CIAT, 2020). Furthermore, various other services are provided via mobile applications, such as individual taxpayer registration, payments, filing personal income tax (PIT) returns, and monitoring tax and customs regulations (OECD, 2019b, 2021c). The effective delivery of services through the RFB's website has considerably reduced the need to go to the physical premises of the TA and, hence, the time needed for a tax service to be delivered.

Taxpayers in Brazil are assigned a tax identification number (TIN), which varies depending on the type of taxpayer. Both individuals and legal persons can get their TIN on the RFB website (the RFB is working toward assigning TINs at birth, and the TIN is accepted even now as a *de facto* identification card) (CIAT, 2020). The information contained in the taxpayer registry must be shared with other public institutions of the federal, state, and municipal governments. For this purpose, Brazil's TA uses blockchain technology as a tool, which aids in sharing this information with other agencies in the country in a "secure and cost-effective way" (OECD, 2021c, 53; CIAT, 2020).⁵⁰

Electronic filing of tax returns is mandatory in Brazil per tax legislation. One hundred percent of taxpayers file their taxes either through the RFB website or the mobile app. Further-

⁴⁸ In some states within Brazil, some other technologies have been implemented. For example, in the State of Piauí, the TA has implemented virtual conversation assistants which are based on AI designed to provide information services to taxpayers (Seco and Muñoz Miranda, 2019).

⁴⁹ Namely, these services are considered as a byproduct of the day-to-day activities of taxpayers. Taxpayers don't access these services directly but are benefited through the rest of the activities already performed.

⁵⁰ Blockchain technology has also been developed by the Brazilian Federal Tax Service for connecting Mercosur Customs (i.e., the customs of Brazil, Argentina, Paraguay, and Uruguay). The blockchain network BConnect guarantees the authenticity of the information shared between the Mercosur jurisdictions. See ERP Latam (2020).

more, since 2014 the RFB has provided individual taxpayers with pre-filled tax returns prepared according to the information received from various sources.⁵¹ This service was initially available only for taxpayers with a digital certificate; however, the RFB has recently decided to extend this service utilizing other validation mechanisms such as facial recognition (Receta Federal do Brasil, 2021). In addition, there is a pre-filled tax return system for recording the social security contributions paid by employers (CIAT, 2019).

For corporate taxpayers, since 2007 there has been a Public System of Digital Bookkeeping (SPED for its name in Portuguese), which combines information from the federal, state, and municipal levels. This system includes registration of digital accounting, electronic signature of documents, and electronic tax invoicing. To develop this system the RFB and taxpayers worked hand in hand (CIAT, 2020). This kind of e-service permits businesses to complete digitally the various processes as part of their daily routine, without having to interact face-to-face with the TA (OECD, 2014). At the same time, TAs can easily assess and cross-check the information in the digital records, which has the potential to significantly decrease audits.

Chile

Chile would rank equally as high as Brazil in its level of digital maturity among countries in the LAC region. According to the Inter-American Development Bank (IDB) digital maturity indicator, Chile's TA is at an advanced stage of its digital transformation process (Barraza, 2021). The Chilean Tax Administration (SII for its name in Spanish) relies heavily on the use of its website, which is an important channel for delivering services to taxpayers. These services include filing of tax returns, access to information regarding their tax obligations, and submission of requests to the TA, among others (OECD, 2012, 2021c). Furthermore, the SII is a pioneer TA in the offering of pre-filled VAT returns (CIAT, 2020). Just as in Brazil, most of SII's core tax services in the first stage of processing tax returns are provided via online channels.

Specifically, the SII's preferred channel for the delivery of services to taxpayers is its website (Jacobs et al., 2013) and the use of mobile applications, such as the application e-Renta, which enables taxpayers to comply with their tax obligations more easily (ECLAC, 2020), or the e-Verifica program, through which citizens can verify the validity of items such as cigarette packs and tax documents that have been signed electronically (e.g., e-invoices, bills of lading, etc.) and report any inconsistencies to the TA (OECD, 2021c).⁵²

⁵¹ The RFB makes use of a system called Malha Fina, which encompasses information received from electronic tax invoicing, credit cards, real estate transactions, withholding taxes, and automatic exchange of information, among others (CIAT, 2020).

⁵² Customs fall outside the scope of this document. However, for the purpose of depicting the status quo of digital tax services in LAC, digital programs that facilitate the provision of customs services are mentioned, where appropriate, as they are relevant for the digital maturity evaluation of the TA as a whole.

Furthermore, as a consequence of the COVID-19 pandemic, Chile deployed an Integrated Taxpayer Assistance System (ITAS) allowing up to seven procedures pivotal to the taxpayer cycle to be carried out completely online: Tax ID requests for starting economic activities, business start-up, activities verification, simple and complex modifications, administrative requests, cessation of business (OECD, 2021c). These services are addressed specifically to legal entities and complement other services that were already provided online and on the web portal of the TA. Therefore, now taxpayers can interact remotely with public officials and carry out formalities online without going to the physical premises of the TA (OECD, 2021c; SII, 2021).

In the case of individuals, the National Identity Number given by the Civil Registry also serves as their TIN, which eases the registration of individual taxpayers as it allows for a one-time registration with government agencies. Legal entities, however, must request their tax registration in the tax registry specifically from the SII. The information required for the registry, as well as modifications and updates, can be submitted via the SII's website. The Chilean TA has also launched an online platform for registration and payment of VAT corresponding to digital services provided by foreign taxpayers residing outside Chile who are liable for VAT in Chile for the services offered therein (OECD, 2021c).

Additionally, pre-filled tax return forms are also available on the SII's website that can be edited if needed and submitted online directly to the tax authorities. Payment of tax obligations can take place electronically as well, and as mentioned before this turns out to be a success story for tax revenue collection as demonstrated by the high level (80 percent) of taxpayers that effectively make online payments (ECLAC, 2020).

It is worth mentioning that Chile was the first country in the LAC region to introduce electronic invoicing (e-invoicing), which has been available since 2003. The Chilean e-invoicing system establishes a clearance model according to which the TA directly validates and certifies the e-invoices issued by taxpayers. This system is known as a centralized model and has been adopted by other countries in the region like Argentina, Brazil, and Ecuador (CIAT, 2020). Furthermore, since March 1, 2021, the use of electronic documents (*boletas electrónicas*) by all types of VAT taxpayers in Chile is mandatory. This means that not only B2B (business to business) transactions are now reported electronically using e-invoices, but also B2C (business to consumer) transactions where goods and services are offered directly to final consumers. Thus, 100 percent of the transactions subject to VAT are reported online to the TA, which has access to this information almost on a real-time basis. The general use of e-invoicing and the massive information available to TAs regarding both B2B and B2C transactions subject to VAT was the pre-condition that permitted SII to establish pre-populated VAT returns starting in 2017 (utilizing Form 29). Taxpayers may review and, if necessary, edit this form before approving and filing it with the TA (CIAT, 2019).

Mexico

Alongside Brazil and Chile, Mexico would be the most recent in the LAC region to demonstrate the most advanced level of provision of digital tax services. According to the Mexican Tax Administration (SAT for its name in Spanish, plus “M” added to distinguish it from the Guatemalan Tax Administration, here SAT-G), in 2014 the SAT-M offered to taxpayers 130 different services through its web portal, reducing the number of in-person procedures almost to nil (SAT, 2018). To structure these services, the SAT-M follows the cycle or temporal phases that taxpayers go through to fully comply with their tax obligations (the so-called “taxpayer’s cycle” or *ciclo del contribuyente*).

The first step in this cycle involves the registration of the taxpayer where taxpayers are assigned a TIN. The TIN can be obtained through the internet by individual taxpayers and for corporate taxpayers through the signing of the company’s statutes before a notary (SAT-M, 2018). To be registered, taxpayers can use their Single Identity Number provided by the Population Registry (CURP for its name in Spanish). However, to get the CURP taxpayers must go in person to the Civil Registry. Similarly, for legal entities the registration is partly online, but at some point, the legal representative of the entity must go in person to the TA. Once taxpayers have a TIN, they need a password (which can be obtained online) to access the tax services provided by the TA such as online filing of income tax returns. Furthermore, the TIN is accompanied by an electronic signature or *e-firma* valid at the TA that allows taxpayers to have access to over 400 governmental services, many of which are not tax related.⁵³

In terms of interaction with the tax authorities, taxpayers have been able to communicate with the SAT-M through an electronic tax inbox since 2014. To activate this service taxpayers must register a cell phone number and an email address. Since 2020 the use of the inbox has become mandatory and taxpayers that fail to register with these communication channels are subject to penalties. Lastly, SAT-M has recently (in 2021) introduced a virtual assistant tool or a chatbot called OrientaSAT, aiming to assist taxpayers with adequately filing their tax returns.

In addition, e-invoicing has become the rule in Mexico as well and is an important part of the tax cycle. It has been also digitalized as follows: (i) the taxpayer obtains the *e-firma*, (ii) a digital seal certificate is issued, then (iii) an application is used to issue e-invoices by extensible markup language (XML), and finally (iv) an authorized provider is contacted or the (free) online platform of SAT-M is used to submit e-invoices (SAT-M, 2018). The Mexican e-invoicing system involves the participation of private providers as trusted third parties, which facilitates

⁵³ Approximately 56 percent of LAC countries provide a legally recognized digital identification (e.g., digital signature) mechanism through which governments provide various services not necessarily tax related (OECD and IDB, 2016).

its widespread use (CIAT, 2020; SAT-M, 2018). This model is known as the network clearance model and has been replicated in other countries of the region like Colombia and Peru (CIAT, 2020). Unlike the Brazilian and Chilean centralized clearance models, the Mexican approach makes use of authorized trusted third parties to increase the capacity and expand the availability of this service. The trusted third parties validate the e-invoices, sign and seal them, and remit them to the issuers and the TA (CIAT, 2020). In the centralized model, the TA oversees the whole operation of the system—the availability of the service, the validation and processing of the invoices, etc. (Barreix and Zambrano, 2018).

The e-invoicing system of Mexico complements the obligation of all taxpayers to register their accounts electronically; this requirement has been in force since 2016 following the standards set out by the SAT-M (SAT-M, 2018). For low-income individuals and micro and small businesses, SAT-M has developed a section in its web portal and a mobile app called *Mis Cuentas* (My Accounts) supporting e-invoicing and permitting taxpayers to register their tax accounting as per above or schedule appointments with the TA as required (ECLAC, 2020; OECD, 2014; SAT-M, 2018).

The e-invoice system that has been in place for tax accounting and VAT purposes provides the starting point where the TA in Mexico gathers information for all taxpayers and is also able to provide pre-filled income tax returns like Brazil and Chile. These pre-filled tax returns are prepared by collecting and processing all types of information relevant for the determination of the income tax or the VAT liability of the taxpayers. The pre-filled forms are subject to the taxpayers' approval or amendment (CIAT, 2019). Once the tax liability is determined, tax payments can be made electronically or in person (SAT-M, undated).

Argentina

As part of the strategic plan of the Argentinian Tax Administration (AFIP for its name in Spanish), the government has over the years made considerable investments to advance its digital transformation (AFIP, 2019; Soria, 2017). AFIP delivers various services to taxpayers through its website and its mobile application. To have access to these services, taxpayers must also be assigned a TIN, which is provided electronically together with a password. A mobile application is also available that allows said services to be provided online (CIAT, 2020). Interestingly, AFIP provides different kinds of passwords that correspond to different security levels to enable taxpayers to have access to different types of service (AFIP, undated; *Clave Fiscal*). Hence, Argentina seems to have made a prior evaluation of the security risks that the online provision of each tax service entails and has tailored security accordingly. This feature could be regarded as an advanced level of digital services provision, or it could be seen as a modification that corresponds to the specific country's needs or perceived cybersecurity risks.

In Argentina, all tax returns must also be filed through electronic channels, while around 80 percent of taxpayers pay their taxes online as well (ECLAC, 2020; CIAT, 2020). Taxpayers must register with AFIP by using an electronic fiscal address (*domicilio fiscal electrónico*), which serves as the communication channel; taxpayers provide an email address and a cell phone number so that their fiscal address is validated, and the TA knows with whom it is communicating each time. This electronic address eases the communications between taxpayers and the TA, creating a 24-hour communication channel throughout the entire year (Redondo Sánchez, 2019). As far as access to documents is concerned, due to the recent COVID-19 pandemic, AFIP has enabled the use of its website for the submission of and requests for different types of documentation that previously could only be done physically (AFIP, undated, Guías). To enable digital submission of documents the TA had to put in place certain procedures for checking the authenticity of such documents and the identity of the taxpayer. In the absence of digital identity records in Argentina, this procedure required the taxpayers to register on the website of the TA with their TIN and electronic fiscal address and use a password as an additional level of security (i.e., level 2 or higher levels of security) (AFIP, undated, ¿Qué es?).

In Argentina, no pre-populated tax returns are provided to taxpayers. Nevertheless, within the AFIP web portal there are digital tools available so that taxpayers can self-assess their tax obligation and then prepare their tax return accordingly. This is much different than a pre-populated tax return since it requires much more of the taxpayer's involvement compared with the other countries (e.g., Brazil, Chile, and Mexico) where the tax return is prepared by the TA based on the data available for each taxpayer.

On the other hand, e-invoicing has been mandatory for all corporate taxpayers in Argentina since 2006. The Argentinian system follows the practice of the other countries in the region such as Chile where the TA operates the e-invoice system by itself in a centralized fashion without making use of third-party providers.

Colombia

Since 2018, the Colombian Tax Administration (DIAN for its name in Spanish) has been investing in its digital and technological transformation as part of one of the organization's strategic pillars (DIAN, 2020). This plan aims to improve the TA's digital platform and improve the services delivered to taxpayers. In this effort, Colombia has the support of the IDB, which has provided a USD 250 million loan for the purpose of improving the effectiveness and efficiency of the Colombian TA. According to the Colombian government, this reform is expected to yield an increase of COP 30 billion per year in tax revenue starting in 2023.

Colombia is an example of a slow digital tax transformation. Only after the pandemic have some initiatives to transform the TA's digital services been accelerated, as in

Argentina. These initiatives focused first on providing electronic access to taxpayers for fulfilling their tax obligations or communicating with the TA instead of going to the TA in person. Various new digital processes had already been devised by the TA at the beginning of 2019, ranging from communication services with the TA through various online mediums (email, chat, or the TA web portal) to the receipt of digital signatures. However, the pandemic triggered the implementation of more and newer e-services. For example, the DIAN allowed taxpayers to book online appointments with tax officials and register and get their TIN online.

Online filing of tax returns and tax payments through a web portal is available, but it is not mandatory. Therefore, online filing coexists with in-person filing and payments, with the latter practice corresponding to 15.5 percent of taxpayers that still file PIT returns in person and pay their taxes at commercial banks (CIAT, 2020). Moreover, despite online filing not being mandatory in Colombia, the DIAN offers a limited pre-populated tax return option, but only for individuals. Individual taxpayers can accept or edit the suggested tax return before submitting it. The availability of this option has increased the number of individuals that file their tax return and pay their tax obligation (thus, the number of taxpayers that might previously classify as non-filers) by more than a million. It has also increased the number of taxpayers that file their tax return on time and has substantially reduced the need for audits or penalties for late filing. The pre-populated or suggested tax returns are partly completed by the TA based on exogenous information reported by various third parties concerning transactions of the taxpayer with clients, suppliers, employers, etc. The information is reported in XML, which allows the TA to classify it, compare it, and cross-check it to determine the tax liability.

In addition, the DIAN's website has information regarding all the services delivered by the TA, including those services that are not provided online. Among the other e-services provided by the DIAN are refund requests and of electronic signatures and certificates of tax residence (DIAN, undated).

Lastly, in 2018, after experimenting with other similar e-invoicing models, Colombia adopted the e-invoicing system that corresponds to the network model, following the experience of Mexico. For Colombia, e-invoicing is a powerful tool both for achieving the TA's goals and for moving the country a bit forward in the process of digital tax transformation. The effective use of e-invoices permits the TA to have more and better information to render better services to its taxpayers and improve the effectiveness of the tax function. Considering the above, in 2020 the Colombian TA implemented an electronic platform called RADIANT for the registration of e-invoices. This new platform aims to ease electronic factoring transactions that provide higher levels of liquidity to taxpayers. This system is modeled on the Chilean experience where the TA manages the Public Electronic Registry for the Transfer of Credits (RPETC for its name in Spanish).

Peru

Peru is another case worth mentioning regarding its progress in the use of new technologies. The Peruvian Tax Administration (SUNAT for its name in Spanish) has started to undertake its digital transformation through investment in and updating of the existing information and communication technology (ICT) already in place. (SUNAT, 2020). The actions to be implemented and envisioned to achieve this objective are discussed in the Digital Government Plan (Plan de Gobierno Digital).

SUNAT already has in place a website through which taxpayers can receive services that enable them to comply with their tax obligations and communicate with the TA, such as tax registration, corrections of tax returns, and filing of specific requests. Several of these services can also be found in the two mobile apps developed by SUNAT, one for individuals and another for corporate taxpayers. Taxpayers can also address SUNAT via telephone, email, or online chats (SUNAT, 2020). More specifically, since 2018, Peru has implemented a chatbot called SOFIA (the name stands for Service Orientation and Facilitation of Information that is Automated). This virtual assistant helps taxpayers to comply with their tax obligations by answering questions and interacting in real time. Since its implementation, SOFIA has improved its responses through machine learning and has become an important 24/7 tool that aided the TA in the tax-related challenges brought about by the COVID-19 pandemic. It provided remote access, timely assistance, and accurate responses to a wide range of tax-related inquiries, offering valuable support to citizens when they couldn't physically visit tax administration offices.

After 2020, when SUNAT implemented biometrics to identify citizens, tax registration could take place online, either via the SUNAT web portal or relevant mobile apps (OECD, 2021c). Passwords necessary for tax registration and other electronic services are also provided online. This provides taxpayers with access to at least 69 percent of the tax services and processes related to their interaction with SUNAT (SUNAT, 2020). Among other services offered by the web portal are online taxpayer access to their administrative files through SUNAT's virtual file system (SIEV for its name in Spanish).

Peru is another country in the region that has made use of e-invoicing since 2016. The e-invoicing model follows the one implemented in Mexico. Currently, the use of this system is not mandatory for all taxpayers, but only for those receiving more than a threshold level of income. Currently, 32 percent of taxpayers make use of e-invoices in Peru (SUNAT, 2020). Lastly, SUNAT is considering how to further improve the provision of e-services starting with the preparation of pre-filled tax returns for VAT based on taxpayers' electronic records. This was envisaged to be implemented in 2022⁵⁴ (OECD, 2021c). In addition, digital bookkeeping

⁵⁴ As this document was being prepared for publication, this improvement had not yet taken place.

or digital accounting for certain business and corporate taxpayers is also being considered by SUNAT and would be welcomed by 70 percent of taxpayers (SUNAT, 2020).

Central American and Caribbean Countries

The level of digitalization among the several TAs in Central America varies to some extent, but it is possible to observe some trends among these jurisdictions.⁵⁵ Some of the e-services already offered by Caribbean TAs include registration, e-filing, e-payments, and issuance of certificates (Beuermann et al., 2021). Also, they provide education to taxpayers on how to comply with their tax obligations and make use of the e-services; this education also takes place through digital channels (Beuermann et al., 2021).

One of the main problems in the delivery of services by TAs in the Caribbean is the management of the registry of taxpayers. Although most of the jurisdictions in the Caribbean require all taxpayers to have a TIN, taxpayer registries suffer from inaccuracies and are not kept up to date (Beuermann et al., 2021; Schlotterbeck, 2017). Furthermore, in some jurisdictions getting a TIN still requires taxpayers to go to the TA in person (Beuermann et al., 2021). Online tax registration is not currently available because it would require a more technologically advanced system in order to include a guarantee of the taxpayer's identity or the verification of documents which in turn would need to be submitted electronically.

On the other hand, electronic filing and electronic tax payment services are provided but are optional, except for Jamaica where e-filing has become compulsory (Beuermann et al., 2021). E-filing is normally carried out through the TAs' web portals that offer the above services and some basic communication with taxpayers. Countries such as the Bahamas, Barbados, Guyana, Jamaica, and Trinidad and Tobago provide taxpayers the opportunity to file their tax returns online and pay their taxes electronically through the TA web portal. This requires the web portal to have some connection with the taxpayer's bank account and offer secure transactions. It should also be noted that in addition to web portals, mobile phone applications have started to become popular in the Caribbean (World Bank, 2019).

The following is a more detailed analysis of two representative Central American countries regarding their current situation in electronic provision of tax services and the progress made in recent years.

⁵⁵ In Costa Rica, for instance, the TA has gone a long way to improve its delivery of e-services, a process that has been accelerated by the pandemic. Similarly, in Guatemala the TA has set out a plan to transform itself and use digital tools in its interactions with taxpayers. These TAs show initiatives to continue their transformation process through the adoption of new technologies and the delivery of new e-services despite the challenges they face in either infrastructure, skills, or financial constraints.

Costa Rica

Costa Rica has a plan to transform and digitalize its TA. This is part of the Digital Tax Administration for the Bicentennial (Hacienda Digital para el Bicentenario), a project financed by a loan from the World Bank (Ministerio de Hacienda Costa Rica, 2020). Various considerations motivated the TA to undertake its digital transformation, the most prevalent of which are (i) the adoption in 2017 of an e-invoicing system following the centralized clearance model implemented by Chile (CIAT, 2020) and (ii) the introduction of new technology leading to more computerization of the tax services offered by the TA, consequent to the introduction of the e-invoicing system (World Bank, 2019). The lack of an adequate level of digitalization of the tax functions Costa Rica's TA made it hard for it to analyze all the information received through the e-invoicing system, which in turn precipitated digital transformation of the TA at all levels.

In 2017, 100 percent of tax returns were processed electronically (CIAT, 2020). However, among the taxpayers that needed to register to obtain a TIN, approximately 64 percent had to register in person since the online registration facility was not available (CIAT, 2020). Therefore, although tax filing may take place online, the lack of an online registry—which to a great extent would ensure quick verification and accuracy of the taxpayer information—resulted in the reduction of some of the benefits of online filing.⁵⁶ The TA acknowledged the problem and proceeded to enable online registration through its web portal. An electronic inbox has also been established as a communication channel with taxpayers.

As mentioned earlier, the COVID-19 pandemic forced TAs to deliver various services online. In Costa Rica, the TA launched the Virtual Procedures Portal (TRAVI), which allows users “to send, check and receive the results of 45 different procedures, and validates the user’s identification against the tax administration database” (OECD, 2021c, 77). At the same time, the Costa Rican TA deployed a new channel of communication with taxpayers based on virtual assistants or chatbots, through which taxpayers could ask the TA questions more effectively and the TA could provide automated answers 24/7 (OECD, 2021c).

Guatemala

Guatemala has been assisted in its digital journey by financial support from the Inter-American Development Bank (IDB) in 2016 (IDB, 2016). The Guatemalan Tax Administration (SAT for its name in Spanish, plus “G” added to distinguish it from the Mexican Tax Administration,

⁵⁶ This means since tax registration did not always take place online in Costa Rica during 2017, we can further assume that all registered taxpayers (either registered electronically or in person) have presented their tax returns via an electronic channel.

here SAT-M) has improved tax services by delivering more and more of them online. For example, online registration for obtaining a TIN is available while in-person registration also remains available. Similar to Costa Rica, tax filing and payments can be completed via SAT-G's web portal, where taxpayers can also download tax forms and access tax information. In 2019, SAT-G implemented the chatbot RITA to answer questions and provide online guidance to taxpayers. Interestingly, in 2018 Guatemala introduced a more advanced version of its e-invoicing system following the networking model first implemented in Mexico. For this purpose, it had to migrate its electronic system to an Amazon cloud provider. This upgrade enabled SAT-G to provide better services that benefited from the advantages of cloud technology such as scalability and cost reduction. This also enabled the TA to expand the scope of the delivery of e-services beyond e-invoicing. Recently, SAT-G has launched its mobile app (APP FEL) to ease the issuance of e-invoices via smartphones (SAT-G, 2021).

Assessment of the Level of Digitalization of TAs in LAC Using Digital Maturity Benchmarks

Digital Maturity Assessment of TAs in LAC Countries

Following the criteria set out in Chapter 3 and the state-of-the-art e-services provided in various Latin American and Caribbean (LAC) countries described in Chapter 4, this chapter classifies the LAC countries according to their digital maturity levels utilizing the framework set out in Chapter 3. This classification will help to identify areas for improvement. We will attempt to apply the criteria that we identified as most relevant for classifying tax administrations (TAs) into three levels of digital maturity, ranging from the lowest to the highest level (i.e., Level 3: low, Level 2: intermediate-advanced, and Level 1: best practices). It should be stressed that the digital maturity assessment of the TAs of LAC countries examined will consider the overall status of their e-services provision but not the level of a specific service per se. This is because while a TA may look quite effective in the provision of a certain service (e.g., e-filing) or advanced in terms of digital communication provision and automation, other tax services (e.g., tax registration) that are preconditions for the provision of the “lead

service(s)” may not be as equally effective or digitally mature. This incongruity will in turn have an impact on the effectiveness of the whole tax function or on the service function of the TA and may result in unnecessary compliance costs and low taxpayer satisfaction with the tax services received.

A restatement of the framework to be used for the assessment is helpful to directly relate the level of maturity of each country with the variables used for the digital maturity evaluation. Table 5.1 integrates the indexes used for the three-tier classification with the corresponding groupings of LAC countries discussed previously. This country classification is based on the current situation of the electronic provision of their tax services.

As may be seen in Table 5.2, the criteria for appraising the level of digitalization of tax services in LAC countries consist of a combination of the most important factors considered by existing digital maturity models described previously. On average these criteria or indexes correspond broadly to four categories: (i) the level of information technology (IT) infrastructure (including internet access for the majority of the taxpayers); (ii) the possibilities for data collection and appropriate processing, effectively leading to certain minimum level

Table 5.1.
DIGITAL MATURITY LEVELS AND ASSESSMENT CRITERIA

Maturity levels	E-tax services	Assessment criteria			
Basic-Low	1. E-Registry				
	2. E-Filing				
	3. E-Payment				
Intermediate	4. Channels of online communication (web portals, apps)				
	5. Automated tax guidance (virtual assistants)	IT infrastructure and internet access	Data collection, processing, and automation	Communication channels and level of integration of exchange of information	Legal framework
	6. Pre-filled income tax returns				
	7. Virtual file systems				
8. E-Invoicing					
Advanced	9. Pre-populated VAT returns				
	10. Public digital bookkeeping				

Table 5.2.**GENERAL FRAMEWORK FOR ASSESSMENT OF DIGITAL MATURITY OF E-TAX SERVICES IN LAC COUNTRIES**

Digital maturity level	Parameters of classification	Indicative e-tax services per maturity level	LAC countries classified according to digital maturity level
Tier 1: Best Practices	<ul style="list-style-type: none"> • Use of sophisticated automation technologies that result in full automation of tax services and are based on TA-taxpayer interaction (real-time tax compliance) • Communication of data with third parties • Aim at efficiency of both internal organization and external services provision (intentional aspect) • Enactment of required legislation that enables digital transformation 	<ul style="list-style-type: none"> • Digital identity technologies—e-registry • Pre-populated tax returns • Data analytics • E-invoicing • E-assessment including cases of e-payment • E-communication and automated tax guidance 	<ul style="list-style-type: none"> • Brazil • Chile • Mexico
Tier 2: Intermediate-Advanced	<ul style="list-style-type: none"> • Various digital solutions already in place, automation usage mainly for internal processes, limited use of third-party data or ability for real-time tax compliance • Aim at efficiency of internal organization • Some legislative reforms in place or under enactment (i.e., such as bank regulations regarding e-payments) • Communication with other public or private agencies for data exchange 	<ul style="list-style-type: none"> • Electronic filing and limited cases of pre-populated tax returns • Limited e-registry • E-invoicing but limited option for integrated tax accounts • E-communication but not automated tax guidance (online apps available for tax reporting and information) 	<ul style="list-style-type: none"> • Argentina • Colombia • Peru
Tier 3: Low	<ul style="list-style-type: none"> • Important steps in digitalization process are taken but are not enough (online communication and filing exist for some taxes but not all) • Aim at efficiency of internal organization • Infrastructure and HR constraints • Legislation is not adopted 	<ul style="list-style-type: none"> • Registration mostly in person • Online filing (limited availability of pre-populated tax returns) • Electronic payments • Web portal communication systems and online apps 	<ul style="list-style-type: none"> • Central American and Caribbean countries (Guatemala, Costa Rica)

of automation of tax services; (iii) the nature of communication between taxpayers and tax authorities or between tax authorities and other government services (direct, real time, automated, integrated); and lastly (iv) the extent of adaptation of the legal framework to the digital reality. The findings regarding the latter criterion are based on the current situation (early

2020s) with respect to the provision of tax services in LAC countries. This current situation analysis only considers whether certain legislation is in place allowing for electronic provision of specific services, but it does not consider the circumstances under which e-tax services are legally offered. Table 5.1 illustrates the general criteria for the digital maturity assessment deriving from our general framework in Table 3.5 and links them with specific tax services offered in different degrees by all the LAC countries examined. Table 5.2 matches and combines the information of both Tables 3.5 and 5.1 with the countries that we examine as representative examples of the countries in LAC.

The foregoing e-services are used as benchmarks to determine an “ideal” standard of digitalization in LAC TAs. The assessment does not follow specific metrics but rather uses qualitative criteria (included in Table 5.1) to determine the ideal scenario regarding each of the e-services considered. Besides, the use of metrics does not always result in conclusive outcomes regarding how a TA reaches a certain level of digitalization or what aspects should be improved (OECD, undated). From Table 5.2 and the descriptive analysis of the current situation in LAC countries, it follows that irrespective of the tier in which we first classified LAC countries based on the general framework of e-services (Table 3.5), some LAC countries provide services that may fall under the advanced cluster of digital maturity while other services are found to be at a lower level. This precludes us from determining whether the TA as such is at a particular overall level of maturity. In this regard the assessment criteria that we apply are intended to provide a further explanation of why some services are found to be at one level or another, since those criteria are ranked according to the sophistication of the tax return processing procedures. Specifically, the level of automation ranges from a basic level to an advanced level corresponding to a rudimentary matching of information for identifying errors in tax returns (at the basic level) to fully automated e-filing combined with e-invoicing (at the most sophisticated level). Thus, the categorization of the services into different clusters reflecting digital maturity is based on the level at which each service complies with the assessment criteria set.

Table 5.1 offers a more concrete explanation of why, for example, countries in Tier 3 that may provide an advanced tax service (e.g., e-invoicing) are evaluated low in digital maturity. This is because in these countries, which are mostly found in the Caribbean region, the assessment criteria regarding the complete set of tax services provided would put these countries at a lower level compared to the rest of the LAC countries examined. This means that if a TA provides all services mentioned in all three clusters, it likely meets all criteria at their highest degree and hence it will be classified in Tier 1. Another example of a tax service that is considered to be at a minimum level but could nevertheless place an LAC country into a higher tier is the provision of an e-registry. This can happen under the following conditions. Say a TA has adapted its legal framework to allow taxpayers to register, obtain, and modify their TIN completely online. Furthermore, say the TA shares the relevant information with

other government entities (i.e., the registry entry is obtained one time by the TA and serves its purposes for the taxpayer's identification and then subsequently is used for other purposes in other agencies). Also assume the TA keeps this service available 24/7 on an automatic basis. Under these circumstances this TA would likely be ranked high in the levels of digitalization, since the e-registry in most of the cases requires a digital background that is also necessary for the provision of other services, assuming that all the above conditions are also met. However, this is not always the case. While some TAs may allow for online registration via biometrics or other systems that are relevant for digital identification of taxpayers, they usually do so without meeting all four factors set out above. For example, some TAs may lack adequate interoperability with other government entities to be able to share data in an effective and secure fashion, or they may not have a clear legal framework or an effective web portal that would allow more services to be automated despite their adequate data entry and processing capabilities.

Overall, the minimum services that a TA should provide as part of its digitalization process are e-registry, e-filing, and e-payment. All TAs studied largely complied with these services and therefore they fulfilled the Level 1 criteria as depicted in the classifications of various international organizations (see Chapter 3). For the purposes of the proposed framework (see Table 5.2), TAs that only comply with these kinds of services would rank at a low level or in Tier 3. Nevertheless, some TAs are more effective in the provision of these services than others. In some cases, services such as the e-registry are already embedded in the usual tax cycle of taxpayers in such a way that they do not notice it.

The second type of services considered above as intermediate are fulfilled by most of the TAs in the first and second tiers (see Table 5.2), and only partially by TAs in the third tier. However, there are TAs that overall rank as Intermediate-Advanced (Tier 2) but lack some of the services considered as intermediate. For example, some TAs in the second tier do not provide taxpayers with pre-filled income tax returns or provide sufficient information services making use of new technologies such as artificial intelligence (AI). For this reason, although classifying TAs into the three digital maturity levels can offer a comprehensive view of the digital status of the whole, it is also important to be able to highlight particular services that can be improved irrespective of whether the TA is classified in a high tier overall.

Finally, those services considered as advanced are those fulfilled by TAs in the first tier, but on some occasions also by TAs in the second tier. Generally, these are services that TAs provide only once they have already fulfilled other low or intermediate e-services that are often prerequisites for rendering the most advanced services (e-invoicing, pre-populated VAT returns, or public digital bookkeeping). These services demand highly sophisticated systems in the TA that are also highly integrated in order to use the information already collected in previous stages of the taxpayer tax cycle.

The classification made for the purposes of our analysis is only indicative of the digitalization level of the TAs examined and should be considered in the context of the specific goals and objectives set out by each TA. On average, most of the TAs are positioned in the intermediate or second tier; that serves as a point of reference to determine whether a given TA would rank at a higher level or in a lower level depending on which criteria are used. Nevertheless, the specific tier in which a TA may be classified in this document is not indicative of whether this level is optimal or not. Each TA follows its own goals and objectives and is motivated by its own purposes that should be the basis for rendering a judgment. Therefore, our attempt to provide a more comprehensive qualitative approach on the one hand complements the results of existing studies on maturity indexes and, on the other hand, offers an alternative, more inclusive approach to the steps that might be taken in the future in each of the LAC countries in the context of a digital roadmap.

The following subsection compares LAC countries based on the services each TA offers and the preceding classification of their digital maturity.

Intra-LAC Country Comparisons

Raising more revenue is an imperative for countries in the LAC region, whose governments undertake various expenditures to meet their constitutional obligations. Although each country in LAC is different, the common denominator in the policy orientation of all countries is how to align their TA functions with the digital era. Thus, the experiences of some jurisdictions may serve as an example for other countries when implementing new technologies for delivering e-services. In this process, the help and support of organizations like the Inter-American Center of Tax Administrations (CIAT) and the Inter-American Development Bank (IDB) play a major role insofar as they build communication channels among the different TAs of the region, allowing the sharing of knowledge acquired with their peers and discussion of problems and solutions, advantages and disadvantages of specific practices.

Within the different tiers of maturity of the TAs examined we can find best practices that can be transferred to others found either at the same level of maturity or at a different level. Depending on the specific circumstances and goals of each TA, these practices may prove valuable in the process of digital transformation in each of the LAC countries.

Identifying Countries' Best Practices in Each Categorization of E-Tax Services

The basic services that TAs should deliver through electronic channels are the registration of the taxpayers and the filing and/or payment of their tax obligations (CIAT, 2020). These services are paramount because they provide the foundation on which TAs can further build.

Delivery of “Basic” E-Tax Services (Registry, E-Filing, and E-Payment)

The Chilean case in the registration of taxpayers represents good practice. The TA in Chile assigns tax identification numbers (TINs) to individuals using the same information as that collected by the Civil Registry in granting national identity numbers. These procedures are chain-based and therefore cannot be applied if the first link in the chain has not been forged. For example, a TIN is necessary for each taxpayer’s account so that it can be linked with all elements of the taxpayer’s tax profile in order for the TA to verify the disparate pieces of information that are relevant to the specific taxpayer. In cases where the tax registry communicates with other government agencies (such as the social security system in countries where that agency is not integrated into the TA or the Ministry of Finance), this TIN must be linked with other identification codes assigned to the taxpayer. (This issue may be solved by assigning only one identification number to each citizen/taxpayer to be used for all his/her interactions with public agencies, as is done in Brazil.)

With respect to e-filing, it is crucial for needed taxpayer information to exist online or be digitally available. A system where documents are filed both physically and digitally creates more confusion rather than allowing more options to taxpayers and flexibility to TAs. If a country has not yet proceeded to the digitalization of its archives, or this exists only in some public agencies and hence is quite compartmentalized, it is unavoidable that the two systems will have to coexist. In most TAs, for example, registrations are either done solely in person or in combination with online registration. In those cases, there is a high risk of mismatches of the actual information that a TA has about a taxpayer. This could occur in cases where not all documents are digitally available and identified by the taxpayer’s account number. Under these circumstances the documents cannot be linked unambiguously to each other and to the taxpayer’s account.

Delivery of “Intermediate” E-Tax Services (Pre-Filled Tax Returns, Online Communications Channels)

Some jurisdictions in LAC countries have already adopted electronic tax inboxes as communication channels between taxpayers and TAs. These electronic inboxes serve as dedicated digital platforms for secure and official electronic communication regarding tax matters. They provide a centralized channel for exchanging tax-related information, notifications, and official documents, ensuring compliance and facilitating efficient record-keeping within the tax system. For example, in Mexico, after a provisional period, the use of this tool has become mandatory, and taxpayers who do not activate their tax inbox are subject to a penalty. Other countries could consider linking the implementation of a digital service with a penalty in case of noncompliance, in cases where all conditions for rendering this service are fulfilled.

Although the imposition of penalties is not ideal for establishing a culture conducive to digitalization for the benefit of both taxpayers and states, it may be a temporary solution, especially in countries where digital transformation challenges are coupled with a culture of low tax compliance. The role of the TA, on the other hand, is to provide a regulatory framework that is clear and comprehensive in order to allow electronic communications and to adequately inform taxpayers of the consequences of not using those digital means of communication. It is evident that making a digital communication method mandatory requires that all potential users have sufficient and adequate access to that means. It is not sufficient to make the system's use mandatory if not all people have access to email or mobile apps for their communication. Internet access is a prerequisite and should be provided for all and at an equal level. A transitional period may be needed where multiple communication methods could be used until everybody has full access to the means that the TA plans to set as mandatory. In addition, in cases where important information for the taxpayer's rights is communicated by email and the taxpayer does not always have easy access to that email or inbox, the taxpayer's right of due process might be violated (such as in the cases of complying with deadlines for petitions and annulment of tax assessment acts). It is also important that the infrastructure of the TA is sufficiently robust to support the confidentiality of the information exchanged with taxpayers.⁵⁷

In addition, in many situations' taxpayers have access to online virtual assistance for either completing their tax obligations or for asking questions. This is a best practice in those cases where TAs are freeing up resources for responding to standard tax questions and at the same time enabling taxpayers to have access to the TA 24/7. However, these tools are not ideal since errors can occur quite often depending on their design. Virtual bots use machine learning technologies to improve their services with time and with more interactions and feedback from taxpayers. Various LAC countries already make use of this technology such as Peru and the Brazilian State of Piauí (virtual assistants SOFIA and Teresa, respectively) and Guatemala and Mexico (chatbots). This technology proved quite successful during the pandemic when taxpayers' personal interaction with tax officials was impeded. Thus, based on the existing performance results, this can be considered as a best practice which is already implemented to some extent across countries of all tiers.

Pre-filled tax returns are an intermediate level service that we also find in various LAC countries either for income or VAT tax purposes, such as Brazil, Chile, Colombia, and Mexico. This practice facilitates tax compliance and saves a lot of resources for both the TA and the taxpayer. In the case of Chile, for example, the implementation of pre-populated tax returns decreased the level of noncompliance by 80 percent. The possibilities for massive adoption of pre-filled tax returns by other TAs in the region depend on the availability of technologies

⁵⁷ For a more detailed analysis on the legal obstacles in digitalizing tax processes, see Chapter 6.

allowing the collection and synthesis of data from third parties, the creation of the adequate algorithms, and the regulatory framework providing for the respect of privacy and due process rights.⁵⁸

Delivery of “Advanced” E-Tax Services (E-Invoicing, Digital Bookkeeping, Virtual File Systems, and Pre-Filled Vat Returns)

Latin America is a pioneer in the adoption of e-invoicing systems, which we find to be implemented in one way or another in LAC countries at all tiers. Within the region there are two basic models that have already been adopted by various jurisdictions: the Chilean centralized model and the Mexican network model. Depending on the maturity level of the specific LAC country, the adoption of an e-invoicing system might be a useful tool to control the underreporting of transactions and to deliver more and better services for taxpayers (Beuermann et al., 2021). Furthermore, for this system to achieve its full potential, it is necessary to use electronic documents not only in B2B transactions but also in B2C transactions. In this regard, the experience of the Chilean TA might be helpful for other TAs in the region. Chile has chiefly adopted a system of electronic documents (*boletas electrónicas*) regarding the transactions carried out between taxpayers and end consumers. The access to this information will buttress the effective control of underreported transactions. This system could be adopted as well by countries in the second and third tier, specifically those countries that have already implemented full e-invoicing systems.

Alongside e-invoicing systems, we find the parallel introduction of pre-populated VAT returns in most countries that are facilitated by the former. Just as with income tax returns, the implementation of e-invoicing systems allows TAs to generate pre-filled VAT tax returns based on the information reported in the e-invoices. Chile is also an example of best practice in this regard as it has already adopted this model successfully. Therefore, applying the Chilean approach in other LAC countries could be possible provided they have already implemented e-invoicing systems. These countries are found particularly in the first and second tier. Other LAC countries should particularly strive to provide access to digital information and documents, as this is a pre-condition for implementing an effective e-invoicing system. This will make possible the introduction of an accurate system of pre-populated VAT tax returns and should reduce the need for audits.

⁵⁸ LAC countries must ensure that the digitalization processes that their TAs undertake advance in parallel with the implementation or adaptation of safeguards for the effective protection of taxpayers’ rights in the context of the new digitalized tax environment. Therefore, LAC countries should aim at striking a balance between more efficient tax processes and the protection of rights such as confidentiality, defense, access to information, and due process, among others.

Parallel to digital access to documents and information is the possibility for TAs and taxpayers to have access to taxpayers' files virtually, as this also enables interactive communication between taxpayers and TAs and hence reduces the time required for solving a particular problem. The experience of the Peruvian TA with its virtual file system is informative, as it permits taxpayers to submit different types of claims regarding diverse administrative processes. This system may also be adopted by countries at the same maturity tier or even in Caribbean countries found in the third tier, depending on their particular needs and subject to the necessary amendments of their internal procedures (e.g., how to determine the validity of virtual files and virtual queries presented by taxpayers in relation to their administrative tax records).

The digital bookkeeping system, a manifestation of another best practice, is immediately related to the issue of accurate digital records and digital access to information kept within TAs. Specifically, TAs should implement registration systems that allow for corporate taxpayers to register their data records concerning their tax accounts and to issue e-invoices based on those records without requiring any other action on behalf of the taxpayer. In this case the tax function could be considered to be fully automated and to be optimal to the extent that the data recorded and used for the e-invoicing are accurate. Brazil uses the Public System of Digital Bookkeeping system (SPED for its name in Portuguese) that ensures all the above but requires a high level of digitalization and cooperation not only between the TA and taxpayers but also between the TA and other governmental entities (CIAT, 2020). The key issue is the availability of adequate technologies for data collection and management and the creation of algorithms fully capable of carrying out the data analysis that must be made, deprived of relevant biases. It is noted that digital bookkeeping will only be successful if the information recorded is accurate. This accuracy requires a technological background that will allow verification based on other information provided by both public institutions and private agencies. All these information cross-checks must assure the relevant guarantees of privacy and data protection while still serving the TA's purposes.

Chapter 6

Legal Constraints to Digitalization

This chapter highlights the most critical legal issues that should be considered when digitalizing tax services and which, as has been demonstrated, are among the factors that determine the level of digital maturity of a tax administration (TA).

The Importance of Tax Data Usage and Management from the Perspective of Taxpayer Rights⁵⁹

Tax information generally includes detailed personal information about a taxpayer's identity and behavior, together with business information and strategies in case of legal entities. Tax information is closely linked with personal data such as an individual's income, dependents, and health and disability status; therefore, security is an important concern.⁶⁰ For tax purposes, the distinction between personal and non-personal data is key to effective TA implementation of the above technologies in order for them to be in line with good

⁵⁹ In this analysis "taxpayer's rights" refers to those relating to the right to be heard by the tax authority, the right to challenge the TA's decision to impose a tax burden or allow the exchange of information before the judiciary, the right to see any information received from another country, and the right to confidentiality of tax information.

⁶⁰ See Cockfield (2019) for examples of some jurisdictions that manage to effectively employ these technologies in order to identify the true tax status of taxpayers but are verging on violating the privacy rights of taxpayers. For example, the Australian Tax Office cross-indexes a taxpayer's insurance

tax policy. Privacy concerns are critical when it comes to the effective use of artificial intelligence (AI) in providing tax services. In some countries privacy rights are regulated either at the constitutional level or at the domestic tax or corporate law level that sets a framework of reasonable and appropriate use of personal information.⁶¹ At a multinational level, certain provisions of the European Union (EU) Convention on Human Rights offer some procedural guarantees of human rights protection against TAs' use of information (Baker and Pistone, 2016). Some level of protection is also guaranteed by the United Nations (UN), as codified in resolutions referring to the risk of invasion of privacy caused by governments' mass surveillance of personal data going beyond pure tax matters.⁶² Another aspect of taxpayer privacy concerns is the risk of personal data being leaked when TAs use certain technologies, especially in the international transmission of information. When information is either retrieved or transmitted to third parties for direct or indirect tax purposes, confidentiality may be breached unless there are inherent rules in the tax design regarding how this information is shared via digital means that can mitigate those risks. This can be done by securing information collected and stored using digital keys and passwords and restricting access only to specifically identified parties.⁶³

In view of the above, all TAs that are currently undergoing a digital transformation are looking into ways to implement new digital tools that would allow for the provision of their services in a fair and efficient manner. Fairness and efficiency are summarized by the term "optimality" of digital tax transformation that allows for an appropriate balance between internal efficiency of the TA's performance and the taxpayers' rights. To this end some coor-

premiums against his or her income in order to analyze risks, and the Greek government has flown helicopters over personal residences to assess the true wealth of taxpayers as compared to the declared values used by the taxpayers when filing their real estate tax or luxury tax returns.

⁶¹ In this context, the Supreme Court of Canada has emphasized the importance of protecting individuals' personal information, repeatedly recognizing the right to privacy as a fundamental human right aimed at protecting the dignity, autonomy, integrity, and security of individuals. See for example the relevant discussion in Cockfield (2017).

⁶² In December 2013, the UN General Assembly adopted resolution 68/167, referring to the human rights risks created by surveillance and interception of communications by new technologies coupled with expansive use of these techniques in international exchange of information (UN General Assembly, 2014).

⁶³ For example, in the Country-by-Country Reporting (CbCR) platform of the Organisation for Economic Co-operation and Development (OECD), governments have agreed to provide and enforce protections for the confidentiality of reported information that are equivalent to the protections provided under an income tax treaty or other exchange of information (EoI) agreement and the automatic transmission of CbCR information is limited to countries that fulfil those requirements. In the United States, the Foreign Account Tax Compliance Act (FATCA) regime also provides some privacy guarantees yet it is considered inefficient due to the non-reciprocal basis on which it functions and other concerns. See indicatively European Commission (2016).

dination at the international as well as regional level should be the ultimate goal of the digital transformation of TAs (Cockfield, 2010).

In Latin American and Caribbean (LAC) countries, new technologies are used by TAs in all three tiers to minimize physical tax audits and/or introduce electronic systems for their communication with taxpayers. These technologies significantly reduce compliance costs and thus raise revenues for the government while helping to achieve international initiatives for universal transparency in automatic information exchange.⁶⁴ The problem that LAC countries face with regard to the respect for privacy rights and due process while applying new technologies for digitalizing the tax function is that these objectives usually clash with constitutional constraints that generally limit the powers of taxation. In some jurisdictions, taxpayers' rights are expressly declared in the tax code itself while in others they enjoy constitutional protection. In Chile it has been ruled that taxpayers' rights continue to be protected, insofar as the scope of protection of such rights may be enshrined in different constitutional or international legal documents, even if these do not explicitly refer to protections regarding taxation (Faúndez-Ugalde, 2019; Supreme Court of Chile, 2014). These rulings emphasize that AI tools should be implemented in accordance with the appropriate safeguards of due process rights including access to information, right to be heard, and privacy rights. Some existing jurisprudence from the United States is informative on the way AI techniques for prediction and decision making should be applied in order to be compatible with taxpayers' rights. For instance, in the case *State v. Loomis*, dealing with discriminatory treatment by an algorithmic assessment, the Supreme Court of the State of Wisconsin ruled that an automated system used for risk assessment should provide full disclosure of the process by which the conclusion had been reached, starting from the point of data entry, through data processing, and arriving at the predicted output (GAO, 2005).⁶⁵ If such disclosure is not possible for technical reasons, it raises the issue of the so-called "black box paradox" of AI applications, where the inner workings of algorithms are not transparent or explainable. This is especially

⁶⁴ For the technologies used in Mexico and Chile see Mancilla Rendon (2010) and SII (2018), respectively. Peru started using an AI system in 2004 for detecting cases of tax evasion. Around the same time Brazil introduced a similar system for risk analysis of tax fraud cases based on the Risk Analysis and Applied Artificial Intelligence System of the Brazilian Tax Administration (HARPIA) project. Since 2016, Brazil has made use of another intelligent system for inspections based on big data analysis for the purpose of controlling VAT and vehicle taxes. In the same vein, in 2007 Chile started to use for the first time a system of data analysis for clustering algorithms in order to categorize taxpayers subject to VAT by extracting patterns from data sets that are akin to the analysis of social and human behavior, namely language, race, and cultural aspects, and identifying further subgroups following some patterns on socioeconomic background. Later, the Chilean TA designed some risk models for analyzing taxpayers' different stages of life cycle, including cases of potential fraudsters. See, among others, Digiampietri et al. (2008) and Lückeheide, Velásquez, and Cerda (2007).

⁶⁵ See similarly Liu, Lin, and Chen (2019).

problematic in cases where reinforced learning is a feature of the algorithm, as this makes it extremely difficult to identify how the algorithm reached its decision. LAC countries using data mining techniques are likely to encounter similar problems in practice depending on how the models they use have analyzed the taxpayers' risk profile, how the AI system in place has processed the information fed to it, and the extent to which the taxpayer has the right to challenge the regulatory finding generated by AI. On the one hand, full disclosure of the path that the AI system followed to reach its decision would enhance transparency and the rights of defense of the taxpayer, but on the other hand it would risk violating another set of privacy laws, rules, or trade secrets. For instance, the Comprehensive Tax Compliance System (CTCS) developed by the Chilean Tax Administration (SII) gave rise to the case of *Zubizarreta v. Servicio de Impuestos Internos*, Rol C1034-11 of the Council for Transparency, which was related to the Integrated Taxpayer Information System. This system is designed to provide a comprehensive view of the taxpayer's tax status. The system used some information from the taxpayer's returns for specific tax years and the taxpayer requested the disclosure of such information. The Chilean tax authority denied the request on the ground that such disclosure could affect the legal or judicial defense of the Treasury, invoking the principle of secrecy or reservation of the information in accordance with Article 21 No. 1 of the Transparency Law. Although the Council for Transparency rejected these grounds as invoked by the Chilean authority and obliged it to disclose the information to the taxpayer, the main issue that the case addressed was with respect to the information on which the "prediction output" was formulated and less on the process as such. Therefore, the main problem that the case highlighted in view of the use of AI systems in the collection of information on taxpayers is how the information is collected so as to preserve taxpayers' rights in those instances when they want to challenge the decision of the system (Bal, 2019).

From the experience of the Chilean tax and customs courts' jurisprudence regarding the uses of AI we may conclude that Chilean tax authorities resort to the AI system as a means for establishing the facts that support the tax ruling in the event of a controversial tax case. This means proof as employed by the tax authorities is highly effective, although it creates problems if the taxpayers cannot access or understand the logic by which the computerized system applied by the TA analyzes the information related to the assessment of the taxpayer's risk profile (Customs and Tax Court of Valparaíso, 2014, 2015a, 2015b, 2016). This practice may clash with principles of public tax trials or the right of the taxpayer to be informed about the process followed by the TA to issue a decision that imposes a tax burden. Under these circumstances, the inability of taxpayers to defend themselves effectively constitutes a fundamental breach of their right to self-defense. It is noted that Article 8 bis, No. 4 of the Chilean Tax Code explicitly states that the actions of the State must expressly provide the reasoning that motivated its actions, including the facts of the case and the logical and legal reasoning used to reach its conclusion, irrespective of whether the legal norm expressly provides for it or

not (Art. 8 of the Tax Code, Executive Order 830 of 1974). Therefore, information on logical or arithmetic operations (logical reasoning) that support the result (conclusion) of the AI information processing, which is fundamental to the right to defense, must always be provided.

Similar legislation exists in other LAC countries such as Peru, Brazil, and Mexico. For example, Article 92 of the Peruvian Tax Code stipulates that taxpayers have the right to be informed of the inspection procedures, the current status of their administrative file, and the information contained therein as used by the tax authorities to assess the respective taxpayer's risk profile for the purpose of combating tax evasions and for risk management. If the TA's actions involve the use of AI tools, those must operate efficiently and offer safeguard mechanisms that ensure the taxpayer's right to be informed of the reasoning behind the computational operations of the AI system as an important aspect of the taxpayer's right of self-defense. In Brazil, an AI tool was used to launch the Risk Analysis and Applied Artificial Intelligence System of the Brazilian Tax Administration (HARPIA) project, based on which the TA was able to detect outliers in foreign trade operations. In this project, registration and classification of products together with their exporters were classified and an automated process was applied. Other automated tax processes were put into use for tax audits and cross-checking of information for validation and authentication of taxpayers. These systems have been regulated by tax legislation that made explicit that the application of technological systems for tax procedures should support taxpayers' rights and allow the administrative act issued by the system to be subject to the rules governing due process (CIAT, 2019).

Automation tools for collecting information and data processing are also used in Mexico for improving compliance. These procedures are coupled with the obligation of taxpayers to keep their accounts electronically and must ensure the taxpayers' right of self-defense including the right to access electronic files (Palomino Guerrero, 2022). The risk model applied in Mexico served as a model for the Transfer Pricing Model developed by Ecuador for the tax years 2012 to 2017 (Kastillo Lopez, 2018). In Argentina, there is a system where data from various sources are included for cross-checking information through risk matrixes. The methodology used for classifying taxpayers in this risk analysis must also comply with taxpayers' procedural guarantees, although the tax legislation in Argentina currently does not provide for any rule allowing the taxpayer to access, at any time, the administrative file that supports the data processing model (Lopez-Pablos, 2013). The right to know the background information used in constructing the mathematical model was thought to be sufficient to ensure the taxpayer's right of self-defense even if the entire process of analyzing the data is not readily comprehensible by the taxpayer. In Colombia, the Colombian Tax Administration (DIAN) has the power to crossmatch digital information using various sources. Furthermore, relevant tax legislation provides for some minimum safeguards regarding how electronic information can be stored and processed so that it respects the taxpayer's right to defense (Gonzalez Mata, Romero, and Padilla, 2019).

Thus, it is evident that tax legislation currently in force in LAC countries may not expressly deal in detail with how taxpayers can access and understand the algorithmic models used in reaching decisions concerning their tax status, but the obligation to protect the taxpayer's rights is deeply enshrined as a fundamental right in almost all countries' constitutional traditions and is also protected by international treaties.⁶⁶ In conclusion, any issue that may arise from the application of digital technologies for the provision of tax services will be solved by the judiciary but the TAs must be aware of and compliant with their obligation to provide the reasoning underlying their automated decisions and to ensure that taxpayers have access to information concerning their individual cases and their rights of self-defense.

The Importance of Data Management and Usage from the Perspective of TAs: The Need for Security Guarantees

Tax data contain very sensitive personal information about the taxpayer such as information on income, spending and savings, employment status, disability status, associations and club memberships, donations to charities, mortgage costs, child support and alimony, and the amount and size of gifts to family members and others (Cockfield, 2010). A lot of data exist in the fiscal system and are now shared and cross-referenced with other public agencies for the purpose of building a taxpayer's risk profile. The challenges for TAs to effectively handle the data they collect from multiple sources not only concern the amount of data and the process of identifying those that are relevant for tax purposes, but also the laws governing the exchange of information. This is because big data sets involve many users, and those users are most often humans that may be driven by personal beliefs or political ideas or may lack the necessary skills to access and evaluate the data. All of this creates risks for the security of information shared among TAs and other public authorities that must be addressed in a dualistic fashion. On one hand, there should be technological tools that will secure the exchange of information or limit the access to only specific users; on the other hand, specific regulations must be put in place to provide for a robust cybersecurity framework (Hatfield, 2018).

The Transformation of the Relationship between Taxpayers and Tax Authorities in a Digitalized World

Increased automation in TAs and the use of new disruptive technologies serve a dual role: to improve tax compliance and to modernize taxpayer services based on the model of customers' experience. For example, Canada and the United States have committed to using AI in

⁶⁶ For a broader analysis on the interaction of taxpayer's rights with the use of new technologies in LAC, see Faúndez-Ugalde, Mellado-Silva, and Aldunate-Lizana (2010).

order to both meet customers' service expectations and to protect their revenue base (OECD, 2016b).⁶⁷ This is achieved by enabling an “end-to-end view” of taxpayers' cases and interactions, through aggregating data on customer experience from every taxpayer's interaction with TAs (Canada Revenue Agency, 2020; IRS, 2019). Through monitoring of these interactions, TAs can identify the points where taxpayers are satisfied and then improve the overall service provided. In addition to advancing the users' experience, the use of AI enhances the integrity of the system.⁶⁸ Among the most prevalent features of the process of automating taxpayer services is the use of AI to assist taxpayers in filing their tax returns and to answer questions. This is done by robotic process automation (RPA). RPA is software used for automating routine tasks and is configured to complete rule-based tasks (i.e., open emails, copy-paste functions, extract structured data, make calculations, connect to other websites or social media platforms, and generally follow if/then logic patterns) (Deloitte, undated). The deployment of RPA for automating taxpayer services can be easily made through a central controller that may interact with a broad range of business applications (Deloitte, undated).

Special attention should be paid to the impact of TAs' digital transformation on taxpayer rights and the public law function of TAs, which is also transformed by the use of new technologies. A huge part of a TA's services consists of providing the public with a variety of assistance and information. Several technological advances including chatbots and automated tax return filing assist in this role. The pre-filing of tax returns is a significant example of the shift to a new paradigm in the relationship between tax authorities and taxpayers due to the use of automation technologies. For example, traditionally the payment of taxes was based on the principle of self-reporting, which implies that taxpayers are responsible for declaring to TAs their income or wealth in order to be taxed accurately. However, modern TAs have considerably departed from this principle and have alleviated the taxpayer from the self-compliance burden. One would say that the core of the role of the TA has not changed, since in any case the TA must enforce the tax and has no relevant discretion in that matter by law. However, tax enforcement via automated tax filing is directed toward a more unilateral transactional relationship. Whereas the principle of self-reporting used to be key to the relationship, this no longer exists, or it is becoming increasingly limited. In an automated tax filing situation, the role of the taxpayer is fulfilled simply by verifying the tax liability as determined by the TA based on the information it has at its disposal. However, this also raises the question of what happens if the automated tax filing has errors or does not reflect the actual tax liability of the taxpayer and the latter does not challenge it. Does the TA have the right to issue a corrected tax return

⁶⁷ For the impact of new technologies in increasing revenues in the United States see also Marr and Murray (2016).

⁶⁸ The integrity is achieved by the accurate matching of computer data for a desired action. TAs are committed to secure privacy, integrity, and verification of any data disclosed for computer matching by the government. See, for example, Houser and Sanders (2017).

or to audit the taxpayer? And under which tax or procedural tax legislation? All these are legitimate questions that have not yet been answered because the use of automated technologies in the tax administration sphere is very recent and no specific administrative rules yet exist for regulating the use of administrative automated decision making in many countries.

The previous paragraphs demonstrate that the use of AI in TAs and public service in general has undergone major debates not only regarding the benefits from improving and modernizing the tax system (OECD, 2016a) but also regarding the legal challenges that emerge therefrom. A lot of jurisdictional examples, coming primarily from common law countries such as the United States, Canada, Australia, and New Zealand, evince the increasing use of AI in providing tax services and the legal issues that arise regarding due process, taxpayer rights, and administrative tax law.

A salient aspect of the use of AI in the provision of taxpayer services is the legal guidance that automated systems offer to taxpayers regarding tax law, frequently referred to as “automated legal guidance.” The review of LAC countries’ current provision of e-tax services shows that the majority of LAC countries in all tiers make use of virtual assistants, especially post-COVID-19 pandemic. The importance of automated legal guidance is not limited merely to policy issues on behalf of the tax authorities and the efficiency in their service provision but also touches on core legal aspects of the constitutional and tax systems of the countries relating to the possibility of judicial review⁶⁹ of the decisions issued by automated systems and the accountability of the respective algorithms (Bevacqua, 2020).

Automation of Tax Guidance Services

Guidance offered by tax authorities to taxpayers includes a variety of services such as explanation of the law in general, explanations tailored to each taxpayer’s situation, press releases, circulars, etc., as well as generalized information available via TAs’ websites. The guidance in administrative law that TAs provide is generally characterized by informality—that is, the taxpayer cannot challenge a decision of guidance (subject to certain exceptions).⁷⁰ The use of AI in the provision of tax guidance complicates the situation to the extent that the guidance provided is not accurate, is unclear, or may confuse the taxpayer who has based his further tax actions on this guidance. In practice, we encounter more and more chatbots integrated into

⁶⁹ See Blank and Osofsky (2020), which states that guidance is a crucial way for the public to learn what the law is and how it might apply in a given situation. When the government issues guidance, it often has a powerful impact on regulated parties. These parties may sometimes change their behavior in response to the guidance, even though guidance is not primarily intended to serve as a coercive form of law. This makes guidance critical to the legal framework.

⁷⁰ The exceptions occur in those instances where the content of the decision goes beyond merely explaining the law and consists of normative judgments.

TA websites or virtual assistants that are trained by natural language processing to respond to taxpayers' questions and often provide personalized assistance. They have the benefit of learning quickly and are highly cost-effective (Berko, 2017).

One famous example of a chatbot used by a TA is Alex, the virtual assistant used by the Australian Taxation Office (ATO) for answering taxpayers' questions such as "How is my income taxed depending on the source?" and "Are my medical expenses allowable for deduction?" The automated hotline service developed by the U.S. IRS took around two years to be completed and tested (Treasury Inspector General for Tax Administration, 2011).⁷¹ The questions that the system is called to answer had to be formalized in order for the technology to be able to provide answers. This means that prior to using such a technology the TA had to be able to translate tax law into a simple and comprehensible language and afterward automate this task, namely by enabling the algorithm to do the necessary assessment of the facts and application of the law.

As previously stated, automated tax guidance ushers in a new era where governments redirect their resources to "outcomes that matter most to citizens" (Mulvaney, 2018, 1). Redirecting resources toward greater use of technology is essentially a result of two things. First, TAs are often faced with budgetary constraints and want to reduce costs, so automation of human tasks where appropriate responds to the cost-savings imperative. Second, TAs want to provide more user-based services and improve customer experience (IDB, 2021). This strategy is further linked to the broader goals of building trust between taxpayers and tax authorities and redirecting tax compliance to be more voluntary and as timely as possible.

A critical issue regarding how TAs will implement the above strategies is the sophistication of the technology used. In principle, more sophisticated chatbots usually rely on predictive analysis to understand taxpayer questions and then assign them to clusters of potential answers. This process may seem simple, but the outcome it produces often reveals the complexity of tax law and the difficulties in providing a clear automated answer.⁷² For example, when taxpayers have questions that can be answered in a relatively straightforward way, the chatbot would be able to provide accurate responses quite efficiently. Generally, this is the case for simple questions such as those relating to deadlines for filing tax returns. The most ambiguous cases, on the other hand, focus on providing answers to questions requiring more interpretative analysis of issues such as the qualification of income or expenses. Even if these cases are sometimes listed and included in the databases of the algorithms' trained data, they often require a more systematic comparison with other provisions of the tax code that cannot easily be done by the AI system. Therefore, in a more complex case, the response that the tax-

⁷¹ For the whole process of building the Interactive Tax Assistant in the United States see Blank and Osofsky (2020).

⁷² See Blank and Osofsky (2020), where the term "simplicity" is used to describe the nature of automated tax guidance.

payer would receive from the virtual assistant would be ambiguous and would risk misleading the taxpayer and result in them making the wrong decision.⁷³

At the same time, the timely way chatbots respond and their immediate interactions with taxpayers are some of the great advantages accruing from the modernization of taxpayer services. One option could be to classify the responses of the virtual assistants into two categories, such as straightforward and interpretative, and subject the latter to the review of a tax official. However, it is arguable whether tax officials have interpretative power over the tax law themselves. There are, for example, cases in which a taxpayer raises with the TA an interpretative tax law question, the answer to which would impact the taxpayer's compliance. Under these circumstances the TA usually refrains from answering and directs the taxpayer to a tax attorney or simply repeats the standard position of the TA on the subject matter. Therefore, in that situation it is still dubious how the practical use of virtual assistance can indeed improve relations between taxpayers and the TA or whether it merely eases the burden of TAs in responding to all taxpayers in a timely manner.

Procedural Safeguards for Automated Tax Guidance Services

Where a virtual assistant is indeed explaining or interpreting the law, it is inevitably making judgments about the law itself and how the law is to be applied in an individual case. These judgments may raise legitimacy, accountability, and transparency issues. In a non-digital world, these issues are solved by offering procedural guarantees (i.e., due process rights) to taxpayers and by framing the TA's actions to follow a pre-determined legal framework. In addition, we often observe that TAs are immunized against undue attacks on behalf of taxpayers in view of an overarching need to protect government's solvency in the exercise of its powers. These issues are all linked to the debate of how much automation we want and how AI systems could be held accountable, if necessary, to preserve the legitimacy of the tax administration process. All these questions are highly jurisdiction specific and there is no one answer that fits all. Besides, in every juridical system, checks and balances are subject to the legislation in question and the social and economic needs at stake. These considerations all highlight the fact that the digital transformation of tax administration is a subcategory of the digital transformation of the government as a whole and the broader policy goals that each country aims to achieve in this regard.

Considering the above, automation of tax services is primarily concerned with the concept of justiciability, namely how tax authorities can be assigned tort liability for an unlawful

⁷³ Also see Blank and Osofsky (2020). These borderline cases produce non-qualified answers and may, for example, falsely indicate that a tax deduction or credit is disallowed or allowed, making the taxpayer refrain from claiming a deduction to which he would be entitled or claim a refund or credit he is not entitled to. In those cases, the use of AI has counter effects and could complicate rather than simplify the law, let alone allow deviations from the law.

exercise of their tax powers. This question is difficult to answer not only due to lack of regulation of the use of AI in many jurisdictions and its civil law implications but also due to the different tax regimes that exist regarding the possibility of raising private lawsuits against tax officials. In fact, in many jurisdictions certain actions of tax authorities cannot be judicially challenged directly by the taxpayer but require a legislative authority by parliament.⁷⁴ It is also worth mentioning that despite the risks arising in relation to the legality of the tax procedure when automation takes place, there should be a framework allowing taxpayers to use automated legal guidance without fear of being sued for utilizing inaccurate advice and allowing tax authorities to actively interact with taxpayers without fear of being sued for giving inaccurate information.⁷⁵

General criteria have been provided by the jurisprudence of several countries over the years establishing the desired balance between due process and tax administration efficiency.⁷⁶ Such criteria are now being revised to see how they could be applied in a digital environment or whether we need a new framework for allowing digital transformation of TAs. It is true that AI is currently applied in a limited way—that is, it is restricted to purely operational functions of TAs for improving their process efficiency. Therefore, discretionary activities continue to be the exclusive responsibility of human competence and more likely will not even be considered by tax authorities when deciding how to automate a tax process. In fact, the confinement of AI to non-discretionary TA tasks is in line with good tax policy principles and good tax administration practices because it does not de facto unlawfully extend the tax power that each country's constitution has delegated to TAs (Administrative Review Council [Australia], 2004).

On the other hand, given the increased pace of technological adoption and penetration of AI in every aspect of business and public governance, nothing precludes a more radical approach to the application of administrative and tax rules in order to adapt to the new reality. In view of this projected reality, due process and taxpayer's rights enforcement will become rather complex. For example, if AI extends to tax administration activities that are clearly discretionary, there will be a need to reconsider the rules governing the annulment of administrative acts and the whole judicial process that the taxpayer would need to follow. Similar concerns have been expressed by the European Union Committee on Legal Affairs with respect to the decision making of the so-called black box of algorithms, which should include both the data considered and the logic that contributed to the final decisions in order to limit the cases of biased judgments (European Parliament, Committee on Legal Affairs, 2017).

Conversely, the black box paradox of algorithms may prove to be useful in carrying out the TA's functions where confidentiality ranks first. For example, when a system applies AI for

⁷⁴ See in this regard the common law jurisprudence discussed in Bevacqua (2020).

⁷⁵ See U.S. Supreme Court (1982), opining on the risks of subjecting officials to risks of trial.

⁷⁶ These criteria refer to the distinction between discretionary and non-discretionary powers of TAs or the distinction between policy and operational function of the TA. See Bevacqua (2020).

audit selection, the mathematical puzzle should not be revealed to taxpayers to avoid the risk of eroding the audit (OECD, 2020a). The issue of confidentiality and how it can be ensured by TAs while making use of new technologies is also inherently linked to the decision of whether to develop the technology in-house or outsource it to third parties.⁷⁷ The decision to build an in-house information technology (IT) infrastructure or software is not only driven by confidentiality concerns but is also influenced by a more fundamental shift to a commercial-private-based customer service improvement.⁷⁸ However, many TAs have experienced technological failures and data breaches in the past⁷⁹ and recent examples relating to the COVID-19 pandemic confirmed the relevant exposures.⁸⁰ These incidents highlight the risks and the possibility of their amplification in the near future given that technological advance will continue and will involve more and more complex functions in TAs' services.

The above analysis is only an overview of the legal challenges emerging from the use of digital services by TAs and, more importantly, of the shift to a new public administrative governance model that some of the examined digital technologies entail. A digital transformation of TAs would necessarily have to take the above concerns into account and come up with solutions that would balance the goals of a modern TA with constitutional due process, taxpayers' rights, and good tax administration principles. However, while the legal framework is crucial it is but only one component of the roadmap to digital transformation that a tax jurisdiction must follow. Other components have to do with the development of a special digital and tax policy strategy and particularly with the criteria that each country should consider upon developing its IT infrastructure and also upskilling or reskilling its tax staff.

⁷⁷ Arguments in favor of an in-house IT development are found in Senate Finance and Public Administration Committee (2018), which mentions that digital work is an inherent and core part of the responsibility of the public service.

⁷⁸ This is linked to the risk management model that TAs currently seek. For example, considering that a TA is defined as both an area of the state administrative actions and as a part of the public administration apparatus consisting of state authorities and institutions appointed to carry out tasks in the field of tax law, it follows that tax collection and service performance must be based on an organizational and functional optimization of the TA. When we refer to TAs' efficiency we mean the efficiency of the TAs' structures, which in turn translates into efficiency of its services. Therefore, infrastructure and ICT are endogenous to the TA's structure and its operational efficiency. See indicatively Lipniewicz (2017) and D'Ascenzo (2015).

⁷⁹ Estonia is the prominent example of a country that after a cyberattack decided to fundamentally change its services and shift to full e-governance; see Mansel (2013) and e-Estonia (2017), which states, "Estonia's current cyber security is bolstered by high-functioning e-government infrastructure, reliable digital identity, mandatory security baseline for all government authorities, and a central system for monitoring, reporting and resolving incidents. Vital service providers are obliged to assess and manage their ICT risks."

⁸⁰ For the Australian and U.S. experience see, respectively, Kershaw (2020) and Taxpayer Advocate Service (2020).

Key Elements to Digitalizing TAs' Functions with Focus on Technology: A Roadmap to Adopting the Appropriate Digital Solution and Path

Improving administrative processes in general using information and communication technology (ICT) requires design and implementation of an ICT system. Traditionally, government agencies do not have the expertise or technical capability to do so and must cooperate with a private agent for the design and/or the implementation of the ICT system. In making this decision, tax administrations (TAs) should consider some core issues such as what they want to achieve by introducing new ICT or improving the existing one. Specifically, they need to consider: (i) the development of the functional and software-requirement specifications of the proposed ICT, (ii) the design and further development of the ICT, (iii) the user experience, (iv) the acquisition and installation of the infrastructure, (v) connectivity, (vi) capacity building of the TAs' staff (both in handling the system and in management of the provision of new services), (vii) digitalization of data, and (viii) provision of

a data center or data center services (cloud computing) (ITC and KFW, 2015). These issues are related to the development or the implementation of the ICT solution per se; however, the decision on whether the ICT should be built in-house or acquired from a third-party provider is based on broader strategic business decisions of each TA.

These must consider, for example, the physical environment of the implementation of the system, skills of the people operating the system, and future maintenance requirements and/or updates as well as the changes that the ICT implementation would bring to the organizational structure of the TA as a whole. Besides, TAs are not inseparable from the rest of the government; therefore, issues that are not tax related but are prerequisites for an effective digital transformation, such as connectivity, should be addressed at the governmental level to prescribe the appropriate ICT solution. In addition, whether the TA should opt for a radical transformation of its information technology (IT) system or for an improvement of the existing one depends on the goals of the ICT implementation and on the findings of a cost-benefit analysis. For instance, it is often argued that the replacement of the entire ICT system with a new one might be less costly and complicated than improving the current one, depending on how the TA wants to improve the efficiency of the tax services provided.⁸¹ The above is also a consequence of the level of digital maturity of each TA, which should be a deciding factor in determining the approach to any ICT improvement.⁸²

⁸¹ See also Seco (2013), where the legal issues are emphasized and which stresses the idea that the digital roadmap or strategy of any TA should include as important pillars both the ICT design and the legal framework.

⁸² See, for example, Cotton and Dark (2017), where these issues are described as the functionality of the ICT specifying that the “heart” of any administration is a set of core systems which enable the basic functions of any tax system to be carried out. Specifically, an administration needs to know who its clients are, what obligations they have, when they are due, and who owes money to whom. This is enabled by an integrated suite of IT programs that provide support for: taxpayer registration, returns processing, taxpayer and revenue accounting, and payment processing. These programs work together to provide what is commonly termed the “core system.” This core system can then be supported by additional systems (also referred to as subsystems or modules) that use the information to provide particular outcomes—for example, electronic filing, case management and workflow for debt collection and audit, and an analytical capability to automatically detect and select audit cases, provide individualized taxpayer service, forecast revenue, etc. Assuming that those systems are already in place, further improvements can be built on those systems. However, if TAs lack basic infrastructure or analytical capability to process information, then a solution to move towards a subsequent service, for example, would have to be based on a process capability (e.g., e-payments would not make sense). The same goes for the case of connectivity that affects taxpayers’ accessibility to tax services. If connectivity is not already widespread, there is no point in legislating mandatory e-filing, etc.

Types of IT Solutions for TAs

A core element in the process of proposing solutions for TAs to improve their tax services via digitalization and automation is to identify which IT system is best to adopt given the digital maturity of each TA. Specifically, it must be determined whether (i) an in-house custom-built system developed by staff or a service provider or (ii) procurement of a commercial off-the-shelf (COTS) product to replace the system that is to be discontinued⁸³ is more appropriate depending on the needs of the TA. As far as tax services are concerned, most countries in the developed and developing world are opting for COTS systems that, through their interfaces, allow taxpayers to perform routine transactions online (i.e., tax return filing, tax refunds, and payments).⁸⁴ The decision to go for a bespoke in-house system or a COTS system is usually based on several factors ranging from a TA's technical capabilities to the amount of available funding and the goals of each public organization (Tansey, 2019). Developing economies usually use a combination of IT solutions across the TA's functions. In Organisation for Economic Co-operation and Development (OECD) countries, integrated ICT systems in TAs are a more common phenomenon than in developing countries. Historically it has been observed that OECD countries prefer custom-built systems for the more traditional functions of TAs and COTS systems for the more modern functions of TAs (OECD, 2010). The distinction between traditional and modern functions becomes very blurred the more we opt for digital integration and the more TAs are performing most of their services online.

In particular, before deciding on how each TA should go about improving its ICT system, a review of the existing system is necessary. The next question is whether the existing system can support further integration. This requires determining whether the existing infrastructure fits the new service provider role that the TA wants to play. It must be borne in mind that improvements to the existing systems can always be made and there might not be a need for radical transformation of the ICT system, given the digital maturity that has already been

⁸³ COTS refers to software and hardware that already exists and is available from commercial sources. When they appeared in the early 2000s, COTS systems were ready-made and usually based on best practice. Although they may have required customization and investment expenses, they were marketed as integrated and configurable to meet the varying requirements of modern TAs with reduced implementation timelines and investment costs. Later, COTS expanded to include enterprise resource planning (ERP) and customer relationship management (CRM) applications. Their main characteristic when they were marketed to TAs was that they constituted all-encompassing solutions, meaning that they offered not only the means to automate processes but also to manage resource allocation and workflow more efficiently while monitoring progress through enhanced management information systems. See Jenkins (1996).

⁸⁴ This is the main way that e-services are provided to taxpayers in Asia and South America; see, among others, Araki (2013).

achieved in a given TA. The experience of Finland in this regard is illustrative; on the path toward the improvement of its ICT the Finnish TA emphasized achievement of the desired goals in each phase of the decision making. The Finnish TA focused on implementing a COTS taxation project as their main goals were to increase compliance, improve taxpayer services, and reduce costs for both taxpayers and the TA (OECD, 2019a).⁸⁵

In principle, the selection of which IT solution a TA should implement is a strategic business decision that must conform to the TA's overall strategic objectives while also ensuring usability and should be preceded by a cost-benefit analysis measuring the appropriateness of the resources to be spent. It bears repeating that although the main objective of TAs is to collect as much revenue as possible there are various other sub-objectives that enhance TAs' efficiency in achieving the ultimate goal. Besides, IT is simply a tool allowing TAs to better perform their tasks. Related interim objectives that TAs have for their IT systems can be, for example, to achieve uniformity in applying tax laws, to provide quality service and taxpayer education, to improve targeted audit programs, etc. All the above may require different IT interventions. For example, uniformity in applying the law can be achieved through automated workflows that reduce the TA's power of discretion (where tax procedural law or constitutional law allows it), while quality taxpayer's services may prescribe an e-tax system. The choice of an IT system is not independent from the institutional structure of each TA. It would be futile, for example, to pursue an IT enabling automation of audit workflows if there were a pending restructuring of the levels of audit reviews and approvals (Jimenez, Mac an tSiobhain, and Kamenov, 2013). Another example of a developing country where the implementation of ICT proved to be beneficial for increasing tax revenue and reducing operational costs is Tanzania (Chatama, 2013). The purpose in Tanzania was to increase timely access to recording and processing of taxes and curb cheating and revenue losses. In that regard, both the public and private sector embarked on the project. Tanzania created a Directorate of Information and Communication Technology (ICTD) responsible for implementing ICT in all tax operations with the result that since this reform, time for processing returns and responding to queries has been reasonably shortened while revenue collection has increased. From the perspective of Tanzania, the fact that revenue has increased is proof that ICT contributed to good tax administration (Chatama, 2013).

Moreover, one of the most prominent obstacles that TAs still face when they are called to decide on what ICT to implement is assessing and then financing the relevant expenditures. In general, the costs of IT implementation tend to include hardware, software, procurement, implementing, integrating, operating, training, and replacement expenses and indirect costs including staff time spent on requirement definition and other procurement activities,

⁸⁵ The COTS implementation in Finland took 10 years. A great part of the new system replaced the integrations of the legacy systems and new integrations were built where appropriate.

testing, and general downtime while the solution is being deployed. There are many other non-quantifiable costs, such as frustration of TA personnel, which may outweigh the benefits that certain IT offers. For example, third-party data matching can improve compliance and enforcement and institute a perception of fairness among taxpayers while promoting voluntary compliance, resulting in higher collections and taxpayer satisfaction. Difficulties of measuring such non-quantifiable costs should not deter TAs from making a tailored cost-benefit analysis depending on the situation.

Many TAs in emerging and transitional economies have difficulty in securing the necessary funding (ITC and KFW, 2015). In these cases, the ICT decision should be based on how the strategic objective of each TA can be achieved with limited ICT spending or lower-cost ICT solutions. In principle, choosing among different ICT solutions requires sequencing. TAs first tend to implement ICT for tax registration and then build on to these basic activities additional functions and services such as online filing, refund processing, and information management, which are the most burdensome and resource-intensive functions. The latter are usually automated first to allow TAs to redirect resources to other areas that cannot be automated. The pattern in building an integrated tax system and choosing an ICT that would best serve each TA's needs usually follows four steps: (i) computerization of generic tax processes that exist in any TA; (ii) data sharing among different levels of government; (iii) technical considerations, such as connectivity of tax offices, which further depend on the availability of technical infrastructure (i.e., a centralized or decentralized orientation); and (iv) management capability to handle client relationships and improve taxpayer service by moving toward a customer-based approach. All four factors are relevant for modernizing TAs but only the first two relate immediately to the decision about which ICT to implement; the rest consist of strategic objectives that are incorporated in the first two and inform the final decision.

In this context, the decision of whether to implement a custom-built ICT system or a COTS solution generally lies in between these two extremes. In reality it is not usually one over the other; rather, these two alternatives can be complementary, especially when a TA is aiming at implementing a comprehensive or integrated system. For the purpose of this analysis, Table 7.1 provides an illustration of the main differences between the two systems that might affect the TA's choice.

Based on the most recent OECD tax data, Table 7.2 provides information on the ICT systems applied in selected countries that are relevant to our analysis and for which information is included in the cited OECD report.

Key Issues for the Transition from E-Services to Digital Services

The transition from e-services to digital services indicates a change in the approach of how TAs use data and technologies. The term digital refers to a whole new mentality that departs from

Table 7.1.**MAIN DIFFERENCES BETWEEN CUSTOM AND COTS ICT SOLUTIONS**

Custom-built ICT solutions	COTS solutions
<p>Advantages</p> <ul style="list-style-type: none"> • Tailored to the TA's structure and needs • Lower initial development cost and potential for more rapid initial implementation • Greater buy-in from counterparts as they have more control over the system and have ownership over design and implementation • Leverages internal expertise • Capitalizes on existing investments (e.g., leverages existing technology investments) • Internal control of enhancements and maintenance • Flexibility to make changes as needed to be responsive to needs 	<p>Advantages</p> <ul style="list-style-type: none"> • Higher quality, fully integrated solutions • Built-in industry best practices for all IT competencies (core tax, management information, compliance performance system, and e-tax systems) • Reinforces best practices • Future development costs shared with other customers • Implementation track record • Cutting-edge technology • Shorter implementation timescales • Rigorous testing and deployment methodologies • Customization required to meet local requirements (including laws and procedures)
<p>Disadvantages</p> <ul style="list-style-type: none"> • Dependency on availability of internal expertise • Significant internal project management capability required for large IT projects • Difficulty retaining key IT staff • Difficulty keeping pace with advances in technology • Difficulty enforcing best practice (e.g., integration across tax types) • Difficulty maintaining high documentation standards • Longer development times 	<p>Disadvantages</p> <ul style="list-style-type: none"> • Lack of buy-in with respect to changes in existing business processes, organization, and IT infrastructure by users • Requires significant change in management capability in absence of in-house knowledge of best practices • Relatively high initial license and implementation costs • Reliance on vendor for support and maintenance • Not component-wise (full package offered)

Source: Jimenez, Mac an tSionnaigh, and Kamenov (2013).

simply digitalizing paper-based processes and making services available online. Digital services respond to a different need from the public (taxpayers as service recipients) and TAs as service providers. The key to the above transformation is innovation in design and performance that aims to increase societal wellbeing and trust rather than simply improving the efficiency and effectiveness of the provision of services as such. This definition and approach of digital government versus e-government was highlighted in OECD (2014), which emphasizes TAs' adoption of strategic approaches to technological change that also signals a cultural change; the report recommends more integration of digital technologies in the whole public sector.

Moving toward digital services also indicates that TAs are digitally maturing and modernizing, but each TA will proceed at a different pace. The steps that each TA takes to become more digital are determined by the situation of the specific TA in the context of the previous stages of its development, but this TA modernization does not completely correspond to

Table 7.2.**OPERATIONAL ICT SOLUTIONS ADOPTED BY SELECTED TAX ADMINISTRATIONS**

Jurisdiction	Custom built		On-premises COTS		Software as a service (SaaS cloud-based)	
	2018	2019	2018	2019	2018	2019
Brazil	Yes	Yes	Yes	Yes	Yes	Yes
Chile	Yes	Yes	Yes	Yes	Yes	Yes
Mexico	Yes	Yes	Yes	Yes	Yes	Yes
Colombia	Yes	Yes	No	No	Yes	Yes
Costa Rica	No	No	No	No	No	Yes
Peru	Yes	Yes	No	No	Yes	Yes

Source: OECD (2021c, Table A.9).

a strategy characterizing the creation of a digital government. This latter strategy is used to describe the “roadmap to digital transformation” for which several measurement indicators have been proposed. For example, the OECD (2019e) offered a theoretical framework based on six key elements that digital government should encompass and then used these indicators to evaluate the digital maturity level of a given TA. These elements are as follows:

- User-driven (listening to users’ needs)
- Government as a platform (collaboration with the public to address common challenges)
- Digital by design (fundamentally committing to digital transformation within governments)
- Data-driven (using data as a key strategic asset)
- Proactive (governments anticipating needs and delivery of services and reacting before these needs actually occur)
- Open by default (governments being transparent and accountable)

Digital services consist of the provision of services to taxpayers via web portals for the purpose of conveying information and conducting consultations. The use of web portals is becoming widespread although their effective use depends on the existence of comprehensive taxpayers’ accounts, up-to-date platforms, and historical records of the taxpayers’ data. Web portals are often coupled with mobile apps and other digital applications.⁸⁶

⁸⁶ It should be noted that in the absence of a specific network on which TAs can rely, mobile network providers could assist in enhancing connectivity or mobile applications can be used to access tax services.

An overview of the technological solutions applied in the Latin American and Caribbean (LAC) countries examined demonstrates that overall, there is a satisfactory level of deployment of digital technologies for the provision of tax services including, among others, e-invoicing, e-mailbox, e-filing, and web portals.

Brazil, Chile, and Colombia have assigned a major role to banks in tax collection. This decision has generally been made both because of insufficient resources in the TAs and because these countries recognize that banks are already specialized in the handling and control of payments. On the other hand, the mere fact that banks are entrusted with the task of receiving payments or even, in some countries, processing returns does not assure success or the possibility of a higher ranking in the digital maturity model. For the collection function to work well, proper systems must be designed that are built on existing appropriately functioning infrastructure and services. In addition, considering that simplicity is an important element in any successful administrative reform, especially in developing countries, the TA must be provided with simpler and, hence, potentially more enforceable laws to administer. One way to achieve simplification in the process of modernization of TAs' functions is, for example, to eliminate demands for superfluous information in tax returns and perhaps consolidate tax returns and payment invoices. The role of data in more sophisticated technologies and their application to tax services is examined below in an analysis of tax services and the digital means employed in LAC countries based on their classification in tiers (which corresponds to an evaluation of their digital maturity).

Best Practices of TAs in Countries outside LAC

Since the analysis so far has been limited to the specific tax, institutional, digital, and legal framework of Latin American and Caribbean (LAC) countries and horizontal comparisons have been made between LAC countries at different levels of maturity, it is now worth discussing how some countries outside the region are dealing with the provision of e-tax services and the digital transformation of their tax administration services. This chapter offers an indicative selection of the countries that are considered by the recent academic literature (based on data collected by international organizations and private companies) to be leading countries in the provision of certain digital tax services as well as in the strategies they have put forward the last five years for the digitalization of their tax function.⁸⁷ The comparison of LAC countries with these leading countries complements the preceding study of LAC countries' experiences with digital transformation of their TAs. This comparison can be used to

⁸⁷ For the vertical comparison with LAC the leading countries selected were China, Estonia, Korea, and Russia based on the following studies: OECD (2021c) (particularly the collected data in Annex A of the report; Brondolo and Zhang (2016); Olowska, Peshori, and Lan (2020); OECD (2020b); and EY (2019). Moreover, apart from incorporating best practices, these countries are nonetheless quite diverse in other respects. Thus, they share the characteristics of the divergence between LAC countries in terms of revenues, GDP, population, and/or institutional structure of TAs.

establish best practices to be followed by LAC countries and to determine which LAC countries would benefit most from applying these best practices (given that LAC countries are currently at different levels of digital maturity).

The Korean Example

Korea has an in-house information and communication technology (ICT) function in its TA (Araki and Claus, 2014). The use of electronic tax filing for personal income tax, corporate income tax, and VAT exceeds 80 percent (Araki and Claus, 2014), while payment of taxes can be done either in person in tax offices or via tax agents, phone banking, internet banking, or kiosk payment facilities. Other electronic tax services provided include comprehensive information on taxpayer status via the internet and the use of social media platforms such as Facebook or X to extend their reach and provide information to younger generations of taxpayers.

Korea has been developing its ICT systems in tax administration and its strategy toward digital tax transformation since 1967 (Awasthi et al., 2019). In 1967 the National Tax Service (NTS) system was founded. Later, Korea aimed for a tax integrated system (TIS). The latter is a full-fledged implementation of an e-tax administration system and began in 1997. It relied on the collection and analysis of massive amounts of financial and income data on taxpayers between 1994 and 1996. The TIS, however, was basically designed to enhance the proficiency of the TA's workflow and has provided less improvement in tax services. The TIS has been complemented by the Home Tax Service (HTS) initiative in 2002. HTS provided for an internet-connected electronic filing system that simplified the computerized work of tax officials and enabled the taxpayer to file and pay taxes from home and work through the internet. In particular, the services provided by HTS include the following:

- E-filing, covering direct/indirect taxes and surtaxes by creating tax returns and attached documents on a PC
- E-notice provided by NTS via the internet or mobile devices
- E-payment for all taxes, simply by entering bank account information on a payment interface
- Simplified Year-End Tax Settlement Service to collect tax deductible or creditable payment information from hospitals, schools, or financial institutions through information technology (IT) networks
- Online submission and issuance of tax-related documents such as tax exemption documents, tax-related forms, business registration certificates, and tax payments certificates by using Civil Certification Internet Access Service
- Automatic calculation of income taxes, tax exemptions, and gift taxes, and submission of taxation data in written or computer forms such as daily working income payment statement, liquor sales record, etc.

In 2011 Korea joined the team of countries that established mandatory electronic tax invoices (ETIs) for claiming of VAT input tax credits. Initially ETIs were offered as a voluntary alternative to paper-based invoices but due to limited or no use by taxpayers, the Korean government decided to make the ETI compulsory. This was done first by preparing the necessary regulatory framework and second by certifying ETI issuers and service providers. In 2009, Korea launched a dedicated website e-Invoice Issuance System (e-sero), through which taxpayers who could not prepare the ETIs on their own could log into the system and obtain one for free. In 2012, the NTS launched an early-warning system (EWS) to combat VAT fraud and identify input tax credit fraud. One of the key functions of EWS is to electronically verify VAT return information at an early stage by cross-checking taxpayers' sales and purchases and screening suspicious refund claims (Awasthi et al., 2019). Because of VAT fraud incidents and the focus on addressing B2C transactions (especially cash transactions), the primary focus of the Korean TA was to be able to electronically trace payments by promoting credit/debit card payments and by asking retailers for electronically traceable cash receipts (ETCRs). As a result, electronically traceable payments (ETPs) increased sharply.

Furthermore, Korea decided to address taxpayer services improvement quite recently through the creation of the Next-Generation Tax Integration System (NTIS), which was launched in 2015 and provided an integrated taxpayers' service portal for external users and an NTS single-window portal for internal users. These portals allowed tax authorities to analyze big data and provided for the tools to better manage taxpayers' tax and other information. NTIS is a renovated system that runs on Java, generating and processing data by setting up its Data Quality Management System to speed up the system and to reduce data error (Awasthi et al., 2019). Tax services currently offered digitally in Korea are online filing, online payment, integrated taxpayer accounts, other online services, and digital mailboxes (OECD, 2017).

The significant use of online filing is typical of other revenue bodies in advanced economies in Asia (e.g., Japan and Singapore), which show a relatively high percentage of tax returns filed electronically (OECD, 2017). In particular, from 2011 to 2013, the rates of electronic tax filing in these countries increased from 87 percent to 91 percent for personal income tax, from 97 percent to 98 percent for corporate income tax, and from 79 percent to 83 percent for VAT (OECD, 2017).

The Russian Example

Since 2016, the Russian tax authorities (FTS) have applied a new tax compliance regime called tax monitoring (also referred to as cooperative compliance),⁸⁸ which is an optional new

⁸⁸ The Russian Federal Tax Service (FTS) signed the first agreements on horizontal monitoring—"enhanced information exchange"—with four taxpayers (RusHydro, INTER RAO UES, Mobile TeleSystems,

system that taxpayers can participate in and which runs in parallel to the existing tax system. As of 2022 this regime is in the testing stage and only used voluntarily by the most digitally advanced large and medium taxpayers who have the highest level of process automation and surpass certain financial thresholds in relation to their income, assets, and taxes paid. By 2021, 209 companies from 15 sectors of the Russian economy were participating in the program.⁸⁹ It is noted that the program does not have a universal application; it applies solely to large- and medium-income taxpayers (i.e., with income or assets exceeding approximately 40 million euros and taxes paid the previous FY exceeding 4 million euros), but it covers all taxes (Rodionov, 2015).

The core principle of tax monitoring is based on developing robust and secure authentication and authorization to provide the tax authority with remote access to the taxpayer's accounting and tax reporting system(s) through application programming interfaces (APIs). It allows direct and real-time access to the taxpayer's ecosystems following a risk-based approach (RBA) that is embedded at a transaction level and provides for ongoing due diligence and monitoring to determine whether the relative transactions contain risks or early-warning signs of non-compliance, tax evasion, or other irregularities within the taxpayer's financial activities. The tax monitoring program enables the Russian TA to achieve well-centralized tax governance either through the following:

- Full connection of tax authorities to the company's IT systems (API)
- "Data window" (dashboards) if companies only partially open up access to their data and documents
- Provision of all supporting documents in XML or PDF/A3 format through IT systems or telecommunication channels

Digitalizing tax governance and not simply tax processes is the ultimate step of digital transformation.⁹⁰ It requires not only new tools to be developed but a whole new culture. This comes with benefits but also challenges, namely the development of and integration with

and the Moscow branch of Ernst and Young [CIS] B.V.) (Rodionov, 2015). In 2014, the Russian government approved a tax administration development plan that would allow the creation of a horizontal monitoring regime (Federal Law No. 348-FZ). The main objectives of this initiative were reducing time spent preparing and filing tax returns and strengthening cooperation between taxpayers and tax authorities, coherence of tax and accounting rules, and enhancing the electronic document flow among legal entities. This horizontal monitoring regime went into effect on January 1, 2015.

⁸⁹ For an overview see Chapter 4 in OECD (2020b).

⁹⁰ To achieve digital governance, Russia applies application programming interfaces (APIs) and real-time tax control based on a standardized tax audit file. It creates the Centralized Risk Register and then implements advanced analytical tools for tax control automation.

digital identity (DI),⁹¹ digital distributed ledger/blockchain, cloud technologies, big data, cognitive computing and artificial intelligence (AI), robotic process automation (RPA), and Internet of Things (IoT).

Russia is also a good example concerning the provision of various e-services. Since 2020, the FTS no longer requires the submission of tax returns for transport tax and land tax, which are calculated automatically using information provided by other government agencies (OECD, 2021c). This service is not only beneficial for taxpayers whose compliance costs are considerably reduced but also for the TA that no longer has “to request and process over 1 million tax returns for these taxes” (OECD, 2021c, 65). Another good practice worth mentioning in the case of Russia is the Intelligent Web Chat (TAXIK), a 24/7 chatbot that provides taxpayers with effective responses to standard inquiries (OECD, 2021d).

In 2020, Russia also implemented an online solution called My Tax, which allows freelancers to access different services that are part of a special tax regime for professional income tax. Taxpayers can register, keep income records, and issue payment invoices. Furthermore, this software solution provides an end-to-end experience in which taxpayers have no need to submit returns or make tax payments because they are automatically deducted on a transaction-by-transaction basis (OECD, 2021d).

More illustratively, the benefits are summarized by the ability of tax authorities to have real-time access to the company’s accounting and tax data, which in turn waives the companies’ obligation or risk to be audited and be subjected to penalties. Since tax monitoring is a voluntary compliance program, there is also the possibility of obtaining a ruling from the FTS on the tax treatment of particular transactions, which reduces the requests for information by taxpayers as to the tax treatment of their transactions and overall reduces compliance costs (Lemetyuynen and Sergeeva, 2018). The challenges or shortcomings of the program are, for example, that audits are not eliminated and that in general there is no clear methodology for how the assessment is to be made under the program. In addition, transfer pricing cases are excluded from the scope, which still leaves a great burden on tax authorities and taxpayers. There is also some skepticism as to the qualifications and experience of the tax authorities’ staff and awareness on the part of businesses (Rodionov, 2015), which raises a lot of doubts about how the system can achieve its potential.

The Chinese Example

In the People’s Republic of China (PRC), the TA is not officially affiliated with the Ministry of Finance. The State Taxation Administration (STA) is an independent agency of the State

⁹¹ This incorporates cryptographic authentication and identification, certification of IT systems, appropriate legal framework, and reinforced qualified electronic signature.

Council and it performs various activities ranging from the drafting of tax laws to the collection of state and shared taxes (ADB, 2020). Additionally, the TA is also responsible for the collection of social security contributions (ADB, 2020). In March 2021, the Chinese government published the Blueprint for Further Deepening the Reform of Tax Collection and Administration (Awasthi et al., 2019; STA, 2021). The blueprint sets out a five-year tax reform plan with the political backing of the government; this is important because it makes the reform part of a systematic policy of the Chinese government and not just of the TA (OECD, 2021a), which resonates with the whole-government approach advocated by the Organisation for Economic Co-operation and Development (OECD, 2020b).

As for the core IT system used by the STA, the approach followed in the PRC combines both in-house and externally developed solutions. Regarding the latter, both commercial off-the-shelf (COTS) and custom-built ICT solutions have been acquired (ADB, 2020). The TA has a website with general tax-related information in which various services are provided to taxpayers such as e-filing, e-invoicing, access to taxpayer data from third parties, digital mailbox, etc. (ADB, 2020). Furthermore, the STA employs AI through its Robotchat, a platform operating 24/7 that allows complex questions to be directed to human experts to ensure taxpayers' satisfaction (OECD, 2021a). As a consequence of the COVID-19 pandemic, the STA expanded the electronic channels to provide more services to taxpayers; this resulted in around 10 million entities and 100 million individuals being able to resolve 214 separate tax-related matters online (OECD, 2021c).

In 1994, the Golden Tax System (GTS) was initiated by the STA for the payment and registration of VAT. Its last phase, GTS III, rolled out nationwide in 2019 to cover other types of taxes (Olowska, Peshori, and Lan, 2020). Its aim is to create a unified platform that processes data at both the state and provincial level of tax administration, covering all taxes and all working stages of tax administration; it encompasses both the State and Local Taxation Bureaus (STB and LTB, respectively) as well. This platform is similar to the Integrated Tax Systems identified above as it allows linking of data from different government departments.⁹² The Chinese GTS includes four systems: (i) the tax collection system, (ii) the external data management and exchange system, (iii) the internal administrative management system, and (iv) the risk management and supervision system. After the launch of GTS III, the tax administration of LTBs and STBs is now merged (Olowska, Peshori, and Lan, 2020). Specifically, at the provincial level, a system is created to facilitate the interaction between taxpayer and tax bureau including electronic self-reporting (e-reporting). Furthermore, the system cooperates with the IT systems of other governmental departments, including information sharing with the social insurance department, the Ministry of Land and Resources, and the Ministry of

⁹² When comparing with the first tier in LAC, we observe that a similar system is employed in Brazil that relies on blockchain technology.

Commerce. Data analysis and risk assessment is made using advanced technologies such as big data and AI (Olowaska, Peshori, and Lan, 2020).

In 2018, blockchain e-invoicing of VAT was piloted by Shenzhen Tax Bureaus and Tencent, by which consumers can scan a QR code to pay for certain goods or services, download the invoice from the WeChat system, and at the same time apply for online reimbursement through the corporate WeChat reimbursement system (Olowaska, Peshori, and Lan, 2020). The reimbursement information is synchronized and written onto the blockchain cloud computing node of the Shenzhen Tax Bureau in real time; it is secured by a unique hash number that is open to authentication, traceable, and unchangeable (Olowaska, Peshori, and Lan, 2020). However, such a system is not yet applicable to the special VAT invoice that is used for input of VAT refunds.

In 2018, the Personal Income Tax App was launched by the STA, comprising around 28 functions for individual income tax such as identity authentication, information collection, facial recognition, and special purpose deduction application (Olowaska, Peshori, and Lan, 2020). Furthermore, for the first time in 2020, China conducted an annual reconciliation of individual income tax returns comprising around 100 million individual taxpayers. In this regard, the STA made use of cloud computing, big data, and AI technology to provide taxpayers with pre-filled annual reconciliation of their individual income tax returns (OECD, 2021c).

The Estonian Example

Estonia is universally recognized for the digital transformation of its government (Kattel and Mergel, 2019). After gaining its independence in 1991, Estonia got off to a good start by investing heavily in its digitalization (ICAEW, 2019). There are two main factors that have made this process a success: (i) the use of the X-Road software that interconnects various services of public and private sectors and (ii) the adoption of a compulsory national digital ID (Kattel and Mergel, 2019). The implementation of these two initiatives in 2001 has allowed the Baltic country to provide various e-services to its citizens, including tax-related services.

Every person residing in Estonia receives a personal identification number (*Isikukood*) that consists of 11 digits based on the person's gender and date of birth. This number represents the person both in the physical and virtual world, and it is displayed on the physical ID card, a mandatory identification document in Estonia. In addition to the physical ID card, citizens can obtain Digi-ID and Mobile-ID cards. Through these identification mechanisms taxpayers have secure access to e-MTA, the online environment established by the Estonian Tax and Customs Board to provide e-services. On this website taxpayers can file their taxes electronically, initiate correspondence with the tax authority, get certificates and documents, view their balance of liabilities, make queries, file requests for refunds, and so on.

Furthermore, Estonia has become the most digitalized country in the world in terms of public services, enhancing the information transparency between taxpayers and government, and facilitating the business environment (e-Estonia, undated). It is the only country worldwide that provides 99 percent of public services via electronic means (e-governance), except for marriage and divorce registration. According to the Estonian government, the provision of its e-services saves over 844 years of working time annually (i.e., government workers' time). This is mainly done through the Estonian Government Cloud, which is in line with the national IT Security Standard (ISKE) to ensure fast and secured e-services. Through the X-Road software various public and private e-service information systems are linked up, which guarantees the materialization of the data-only-once principle—that is, asking just one time for information from users and not replicating procedures (Laid, 2018).

General Assessment of the Comparative Analysis across Countries

A first takeaway from the comparisons between Latin American and Caribbean (LAC) countries that this study pursued is that tax administrations (TAs) in LAC countries are at different digitalization stages concerning the delivery of e-services. Regardless of their stage of digitalization, all the studied TAs already have a minimum level of digitalization that consists of e-registry, e-payment, and e-filing. Thus, using digital means for the delivery of these basic services and other more advanced types of services is already the general rule in the various LAC countries despite the fact that there is still a considerable portion of the population that does not have access to the internet.⁹³ Furthermore, all the TAs studied have set plans to continue their digitalization journey as can be observed from their management reports and their partnership projects with international organizations such as the IDB and the World Bank. The goals pursued by TAs in LAC countries concerning a more efficient, fair, and simple tax system are shared by nearly all jurisdictions. Nevertheless, although the e-services that LAC countries provide and the goals they pursue

⁹³ According to World Bank (2019), 68 percent of the population in Latin America and the Caribbean make use of the internet. In contrast, in the European Union this value raises to 88 percent.

are similar in many respects, each TA has different constraints and specific goals regarding its further digitalization.

The digital maturity model proposed in this document⁹⁴ serves as a point of departure for TAs to assess their current digitalization level in the provision of e-services. As already mentioned in Chapter 5,⁹⁵ this assessment is only indicative of the current level of a TA with respect to specific criteria (IT infrastructure; data management; intercommunication between TAs, taxpayers, and other government entities; and the adequacy of the legal framework). Once a TA has determined its current relative digital maturity according to these benchmarks, it needs to contrast its own level against its goals, objectives pursued, and internal constraints. Most likely, many TAs would aim to provide e-services already offered by other TAs in the region and in this regard a comparative analysis may be helpful to draw up an action plan. However, the specific peculiarities of each TA and country must be weighed against the benefits and challenges of each digitalization proposal. LAC countries' jurisdictions should reexamine their currently offered e-services and how they can be made more effective or what policy problems persist. As an illustration, various TAs already provide e-invoicing services, but many of the TAs that offer these services still have weaknesses in other more basic areas of the taxpayer cycle such as registration. Therefore, e-invoicing will only achieve its purpose if the conditions for its adequate implementation have been effectively fulfilled already. In this regard, it is not enough to concentrate only on the tax function, but rather on the digitalization of the whole government, which has been a salient aspect in the experiences of countries external to LAC.

As far as comparing LAC countries with leading countries external to LAC, we would stress that the four countries external to LAC that were studied in Chapter 7 are highly digitalized in one way or another. They would qualify as good examples of best practices to which TAs in LAC countries could aspire while on their digital tax journey. However, the circumstances under which these TAs operate are to some extent different from those applicable to LAC countries: they are located in different geographic areas (Europe and Asia), they have different population sizes, they speak different languages, etc. Nevertheless, these differences are not insurmountable obstacles to making a meaningful comparison that would advance future digitalization in LAC countries.

As stated before, TAs in general, regardless of the country, aim to achieve good tax policy and administration principles in the performance of their tax function. Therefore, the lessons learned, for example, in the case of Chile might be useful for the digitalization process of a country in Europe, Asia, or Africa. Likewise, the insights of highly digitalized TAs such as those in Korea, Russia, China, and Estonia are also informative for TAs in LAC countries.

⁹⁴ Combining the main aspects of the three subvariants of maturity models discussed: the IDB digital maturity model, the CIAT digital maturity model, and the OECD model.

⁹⁵ See in particular Table 5.2 herein.

Each of the TAs external to LAC examined by this study is considered to be utilizing best practices that might apply for the purpose of improving the digitalization agenda of LAC countries. In general, all the TAs studied outside LAC offer basic and intermediate e-services, and many of them also deliver advanced e-services. In the case of Korea, the digitalization process started as an overarching strategy set by the government and some of the main milestones in this journey were e-invoicing (similar to the experience of LAC countries) and centralized delivery of e-services. In Russia, the strategy adopted by the TA was to reach such a level of connection with the private sector that the record of economic activities would be available to the TA almost on a real-time basis. China has made great progress in the use of new technologies such as blockchain and integrated systems for delivering services to taxpayers in a user-friendly fashion. Finally, Estonia has adopted a comprehensive approach in its digitalization process focusing not just on the tax function but the complete role of the government.

By and large, TAs in LAC countries can benefit to a great extent from the experiences of these foreign countries, especially given that the objectives of the TAs tend to converge. However, TAs in LAC countries should also be advised to consider the different factors in which each TA operates in terms of the legal framework, human and economic capacity, cultural differences, and so on.

Chapter 10

Concluding Remarks

Digital transformation of tax administrations (TAs) in Latin America and the Caribbean (LAC) has started and is growing fast. TAs do not operate in a vacuum but are part of the whole institutional and organizational structure of public administration in every state. This means that the decision to modernize TAs, especially through the use of information and communication technology (ICT), is not based merely on tax administration criteria but is taken in the context of a broader strategy framework pertaining to how each state envisions its role in the future. Nonetheless, inherent tax administration goals regarding raising more revenue, providing more modern services, improving the efficiency of the TA's internal organizational structure, enabling voluntary compliance and trust, and simplifying tax procedures are integral to the digital transformation of government services in general.

The use of digital technologies has increased in recent years and the COVID-19 pandemic has precipitated the implementation of more and more digital means for interaction between taxpayers and tax authorities. This experience has definitively proved that the new norm is digital and that it is also feasible. In addition, it has already been confirmed that the use of ICT by TAs enables the achievement of the above tax administration goals. The question that now remains is how to go about digital transformation in a consistent and effective way that also allows TAs to adopt a digital culture. This requires several steps be taken that do not always relate to which technology to adopt. The experience of LAC countries illustrates how the divergences that exist even between countries of the same region in terms of income, infrastructure, organizational structure, and legal framework do not allow for a uniform solution.

However, best practices have been identified from an intra-LAC comparison and from a brief examination of some leading examples of countries external to LAC.

LAC countries have been divided into three tiers indicating their level of digital maturity in terms of the implementation of digital and electronic tax services. The taxonomy of the countries followed an initial assessment of the digital development of the countries, which mapped the current situation regarding the provision of e-tax services and then evaluated the digital maturity based on a comprehensive analysis using digital maturity indexes. Such digital maturity assessment includes the level of sophistication of the technological tools applied in the provision of tax services (the use of electronic means of filing, communication, and payments, and also legal guidance), but also whether the legal framework is congruent with the digital tax administration developments and the organizational structure of each TA. In Table 5.2 the classification of TAs in LAC countries is based on three levels of digital maturity, ranging from the lowest to the highest level (Level 3: Low, Level 2: Intermediate-Advanced, and Level 1: Best Practices). This classification methodology considers the overall status of the provision of e-services in order to evaluate the impact of digitalization of the entire tax administration function. Our framework aims to connect the level of maturity of each country's TA with the variables that we consider for our digital maturity evaluation. The parameters establish the criteria for the evaluation of the use of sophisticated technologies leading to full automation and enabling real-time tax compliance, availability of third-party data sharing, efficiency of internal processes and infrastructure, interoperability with other public agencies' systems, and legislation in place that is consistent with e-tax services provision. Using this framework we classify the digital maturity of e-services in the TAs of LAC countries according to the degree to which each of the selected LAC countries satisfied the above parameters. It has been found that services such as digital identity (DI), e-registry, pre-populated tax returns, e-invoicing, e-assessment including e-payment, and automated tax guidance constitute best practices and therefore rank first in digital maturity. These services are offered at the highest digital maturity level in Brazil, Mexico, and Chile; thus, these countries are classified in the highest tier of digital maturity (Best Practices). Argentina, Colombia, and Peru are offering some of the above e-services but to a limited degree of digitalization and hence are classified as Intermediate/Advanced. In this second tier of countries e-filing and e-registry are equally available, but there is only a limited possibility of pre-populated tax returns and e-invoicing for integrated tax accounts and no automated tax guidance is available except for the online apps for information reporting. Lastly, countries that rank at the lowest level of our digital maturity classification include the Central American countries (Guatemala and Costa Rica) where tax registration is mostly in person. Online filing is offered as well as electronic payments, but no pre-populated tax returns are available.

Our classification is based on evaluating whether selected countries surpass a digital tax services provision threshold set by reference to digital maturity indicators. The paradox

of this taxonomy is that although the TAs in some LAC countries provide other services that exceed the more advanced digital maturity threshold, they may rank lower with respect to the corresponding digital maturity benchmark for tax services. Therefore, the overall level of digital maturity of the TAs as such cannot be assessed. However, our findings are important in that the services examined constitute a significant part of the tax function of TAs in LAC countries and improving the efficiency of even some tax services through digitalization is likely to have positive results with respect to overall tax revenue collection and reduction of the tax gap. Areas for improvement that have been identified depend on the current level of integration of digital services provision so that the digital tax roadmap builds upon processes that are sufficiently digitally mature. However, these improvements cannot be implemented in isolation but instead require integration with other existing systems. To illustrate the above, although some TAs allow for online registration via biometrics or other systems that are relevant for digital identification of taxpayers, they usually do it without prior assurance of adequate interoperability with other government entities to share data in an effective and secure fashion, or without having invested in the design of an appropriate legal framework. Regardless, the taxonomy of TAs in certain LAC countries provided in this document is not prescriptive of any optimal level of digital maturity. Each TA should pursue its own goals and objectives and follow its digital roadmap in an individualistic manner. Therefore, our contribution focuses on providing a comprehensive qualitative approach, that on the one hand complements the results of existing studies on maturity indexes and, on the other hand, offers alternative steps that TAs in LAC countries can take in the near future on their path of digital transformation.

Overall, it has been further observed that besides increasing tax revenue, all LAC countries are concerned with efficient allocation of resources. This means that electronic payments should also extend to countries that do not use it currently. Moreover, some countries at the Intermediate/Advanced level of digital maturity have copied the example of others found to be at the Best Practices level. This approach allowed the former countries to move quickly to a modern solution, but it was not based on more careful determination of which solution could be best tailored to their needs. E-invoicing is one case in point, as its effective implementation requires the use of additional technologies and data strategies.

Furthermore, the technological infrastructure that is available or is to be established in TAs should also aim at simplicity, especially when it comes to digital tax transformation in developing countries. Simplicity means, among other things, that TAs must be provided with simpler and, hence, more easily enforceable laws to administer, which leads to simplification of the tax procedure as well. One way to achieve simplification in the process of modernizing TAs' functions is to eliminate demands for superfluous information in tax returns and perhaps consolidate tax returns and payment invoices. These more specified goals can be achieved either within the existing information technology (IT) systems or by improving them in that

direction. If, on the other hand, data cleaning cannot be accomplished by enabling e-filing within the existing system, then a commercial off-the-shelf (COTS) solution could be appropriate as it would be less costly and more sustainable.

In addition, data management, privacy, and taxpayer rights are factors that should not be neglected and are inherent in the decision to implement digital communication means and digital tax procedures. The overview of the legal frameworks in LAC countries highlighted that digital systems have been implemented without due regard to the legal issues arising therefrom. As a result, a lot of the problems had to be solved by domestic courts. In a few cases it turned out that the existing legal framework was adequate to solve the digital tax issues in question, but in other cases it was not.

Moreover, despite the tax collection capacity that a TA may have, it is necessary to train employees and apply a continuous reskilling and upskilling of the human capital. Very few LAC countries have invested in such practices internally, and those that have are broadly classified as adhering to best practices. The overall percentage of employees specialized in ICT in LAC countries is relatively low compared to the total number of employees.

Finally, the examination of countries external to LAC showed that their level of digitalization is generally higher than that in LAC countries for all tiers. This means that solutions already applied in Korea, Estonia, China, or Russia as exemplars cannot automatically be transposed to LAC countries. In addition, the experience of countries external to LAC proves that digital tax transformation is not something that happened from one day to another. It required strategic plans, pilot programs and transitional periods, and large investments not only in the TAs but in the transformation of all government services. Nevertheless, the strategies and synergies implemented by countries external to LAC are informative for LAC TAs as to how to design an effective digital tax administration roadmap that is not limited to the technological advance of a single tax service but extends to a broader reform of public institutions and tax structures.

References

- ADB (Asian Development Bank). 2014. Tool Kit for Tax Administration Management Information System. Manila: Asian Development Bank.
- . 2020. A Comparative Analysis of Tax Administration in Asia and the Pacific: 2020 Edition. Manila: Asian Development Bank. Available at <https://doi.org/10.22617/TCS190240>.
- Administrative Review Council (Australia). 2004. Report 46: Automated Assistance in Administrative Decision Making 2004. Available at <https://www.ag.gov.au/legal-system/publications/report-46-automated-assistance-administrative-decision-making-2004>.
- AFIP. Undated. Clave fiscal: Trámite electrónico. Retrieved May 30, 2023, from <https://www.afip.gob.ar/claveFiscal/solicitar-clave/tramite-electronico.asp>.
- . Undated. Guías Paso a Paso. Retrieved May 30, 2023, from <https://serviciosweb.afip.gob.ar/genericos/guiasPasoPaso/VerGuia.aspx?id=363>.
- . Undated. ¿Qué es? - Características - Presentaciones digitales. Retrieved May 30, 2023, from <https://www.afip.gob.ar/presentaciones-digitales/caracteristicas/que-es.asp>.
- . 2019. Plan Estratégico 2019–2023.
- Alink, M. and V. van Kommer. 2016. Appendix II: Overview of Taxes in Latin America. In M. Alink and V. van Kommer, *Handbook on Tax Administration* (2nd ed.). Amsterdam: IBFD.
- Araki, S. 2013. Electronic Taxpayer Services in Asia and the Pacific. Manila: Asian Development Bank.
- Araki, S. and I. Claus. 2014. A Comparative Analysis of Tax Administration in Asia and the Pacific. Tokyo: Asian Development Bank Institute. Available at <https://www.adb.org/publications/comparative-analysis-tax-administration-asia-and-pacific>.

- Awasthi, R. et al. 2019. The Benefits of Electronic Tax Administration in Developing Economies: A Korean Case Study and Discussion of Key Challenges. Washington, DC: World Bank Group. Available at <http://documents.worldbank.org/curated/en/702111557245625049/The-Benefits-of-Electronic-Tax-Administration-in-Developing-Economies-A-Korean-Case-Study-and-Discussion-of-Key-Challenges>.
- Baker, P. and P. Pistone. 2016. BEPS Action 16: The Taxpayers' Right to an Effective Legal Remedy under European Law in Cross-Border Situations. *EC TAX REVIEW* 25(5-6): 335-345.
- Bal, A. 2019. Ruled by Algorithms: The Use of "Black Box" Models in Tax Law. *Tax Notes International* 95(12): 1159-1165.
- Barraza, F. 2021. The Chilean Case. Digital Transformation of the Tax Administrations in Latin America: Digital Maturity Model. Online presentation organized by the IDB. June 15.
- Barreix, A. and R. Zambrano. 2018. La Factura Electrónica en América Latina: Proceso y desafíos. In A. Barreix and R. Zambrano (eds), *Factura Electrónica en América Latina*. Washington, DC: IDB and CIAT. Available at https://www.ciat.org/Biblioteca/Estudios/2018_FE/2018_Factura-Electronica_AL_BID_CIAT.pdf.
- Berko, E. 2017. 3 Reasons Why AI-Powered Customer Service Is the Next Big Thing. ELEKS blog. November 2. <https://eleks.com/blog/artificial-intelligence-customer-service-next-big-thing/>.
- Beuermann, D. et al. 2021. *Economic Institutions for a Resilient Caribbean*. Washington, DC: Inter-American Development Bank. Available at <http://dx.doi.org/10.18235/0003053>.
- Bevacqua, J. 2020. Tax Authority Immunity in a Digital Tax Administration World. *EJournal of Tax Research* 18(2): 402-440.
- Bird, R. 2010. Smart Tax Administration. *Economic Premise* No. 36. Washington, DC: World Bank. Available at <https://openknowledge.worldbank.org/entities/publication/28ff88adf0e2-54e1-9100-989586c7e0d4>.
- Bird, R. M. and M. C. de Jantscher. 1992. *Improving Tax Administration in Developing Countries*. Washington, DC: International Monetary Fund. Available at <https://doi.org/10.5089/9781557753175.071>.
- Blank, J. D. and L. Osofsky. 2020. Automated Legal Guidance. SSRN Scholarly Paper ID 3546889. Social Science Research Network. Available at <https://papers.ssrn.com/abstract=3546889>.
- Boost.ai. Undated. The Ultimate Guide to Chatbots for Enterprise. Boost.ai. <https://www.boost.ai/chatbot-guide-for-enterprise>.
- Brondolo, J. and Z. Zhang. 2016. Tax Administration Reform in China: Achievements, Challenges, and Reform Priorities. IMF Working Paper 16(68). Washington, DC: International Monetary Fund.

- Canada Revenue Agency. 2020. 2019-20 Departmental Plan. Available at <https://www.canada.ca/en/revenue-agency/corporate/about-canada-revenue-agency-cra/departmental-plan/departmentalplan2019-20.html>.
- Chatama, Y. J. 2013. The Impact of ICT on Taxation: The Case of Large Taxpayer Department of Tanzania Revenue Authority. *Developing Country Studies* 3(2): 91-100.
- Chavarry Galvez, D. P. and W. P. Chavarry Galvez. 2021. Evaluation of the Digitalization Development Level in the Latin-American Economy. *SHS Web of Conferences* 114: 01015.
- Cho, K. Undated. Social Media as Tools of the Korean Government's Policy Communication. Colchester, UK: ECPR. Available at <https://ecpr.eu/Events/Event/PaperDetails/28619>.
- CIAT. 2019. Declaraciones tributarias Pre-elaboradas. Working Paper No. 2. Panama City: CIAT. Available at https://www.ciat.org/Biblioteca/DocumentosdeTrabajo/2019/DT_02_2019.pdf.
- . 2020. ICT as a Strategic Tool to Leapfrog the Efficiency of Tax Administrations. Panama City: CIAT. Available at https://www.ciat.org/Biblioteca/Estudios/2020-ICT_STL_CIAT_FMGB.pdf.
- CIAT, GIZ, and IDB. 2015. CIAT Tax Procedure Code Model: The Ibero-American Approach. Panama City: CIAT, GIZ, and IDB. Available at https://www.ciat.org/Biblioteca/DocumentosTécnicos/Ingles/2015_CIAT_tax_code_model.pdf.
- Cockfield, A. J. 2010. Protecting Taxpayer Privacy Rights Under Enhanced Cross-Border Tax Information Exchange: Toward a Multilateral Taxpayer Bill of Rights. *UBC Law Review* 42(2): 419-471. Available at <https://doi.org/10.2139/ssrn.1356841>.
- . 2017. How Countries Should Share Tax Information. *Vanderbilt Journal of Transnational Law* 50:1091. Available at <https://papers.ssrn.com/abstract=3103151>.
- . 2019. Sharing Tax Information in the 21st Century: Big Data Flows and Taxpayers as Data Subjects. *Canadian Tax Journal* 67(4): 1179-1199. Available at <https://papers.ssrn.com/abstract=3510273>.
- Collosa, A. 2021. How to Measure the Digital Transformation of Tax Administrations? Panama City: CIAT. Available at <https://www.ciat.org/how-to-measure-the-digital-transformation-of-tax-administrations/?lang=en>.
- Cotton, M. and G. Dark. 2017. Use of Technology in Tax Administrations 1: Developing an Information Technology Strategic Plan (ITSP). *Technical Notes and Manuals* 2017(01). Washington, DC: International Monetary Fund. Available at <https://www.elibrary.imf.org/view/journals/005/2017/001/article-A001-en.xml>.
- Crandall, W. J. 2010. Revenue Administration: Autonomy in Tax Administration and the Revenue Authority Model. *Technical Notes and Manuals* 2010(12). Washington, DC: International Monetary Fund. Available at <https://elibrary.imf.org/view/journals/005/2010/012/005.2010.issue-012-en.xml>.

- Customs and Tax Court of Valparaíso. 2014. Decision 27/11/2014, RUC 13-9-0001439-7, RIT GS-14-00177-2013.
- . 2015a. Decision 25/03/2015, RUC 14-9-0001061-4, RIT GS-14-00085-2014.
- . 2015b. Decision 30/03/2015, RUC 14-9-0001169-6, RIT GS-14-00091-2014.
- . 2016. Decision 28/04/2016, RUC 16-9-0000156-1, RIT ES-14-00036-2016.
- D'Ascenzo, M. 2015. Global Trends in Tax Administration. *Journal of Tax Administration* 1(1): Article 1. Available at <http://jota.website/index.php/JoTA/article/view/15>.
- Deloitte. Undated. Robotic Process Automation (RPA) for Tax. Deloitte United States.
- Development Bank of Latin America. 2020. El estado de la digitalización de América Latina frente a la pandemia del COVID-19. Santiago: CAF. Available at https://scioteca.caf.com/bitstream/handle/123456789/1540/El_estado_de_la_digitalizacion_de_America_Latina_frente_a_la_pandemia_del_COVID-19.pdf?sequence=1.
- DIAN. Undated. Trámites tributarios. Retrieved April 12, 2021, from <https://www.dian.gov.co/tramitesservicios/tramites-y-servicios/tributarios/Paginas/tramites-tributarios.aspx>.
- . 2020. *Transformación DIAN por una Colombia más honesta*. Bogotá: DIAN. Available at <https://librotransformaciondian.dian.gov.co/#p=1>.
- Díaz de Sarralde, M. S. 2019. Overview of Tax Administrations: Structure; income, resources and personnel; operation and digitalization ISORA (International Survey on Revenue Administration). Panama City: CIAT.
- Digiampietri, L. et al. 2008. Uses of artificial intelligence in the Brazilian customs fraud detection system. *Proceedings of the 9th Annual International Digital Government Research Conference*, 181-187. Available at <https://www.ic.unicamp.br/~siome/papers/digiampietri-dgo08.pdf>.
- ECLAC. 2020. Fiscal Panorama of Latin America and the Caribbean 2020: Fiscal Policy Amid the Crisis Arising from the Coronavirus Disease (COVID-19) Pandemic. Santiago: ECLAC. Available at <https://www.cepal.org/en/publications/45731-fiscal-panorama-latin-america-and-caribbean-2020-fiscal-policy-amid-crisis>.
- e-Estonia. Undated. e-Governance. e-Estonia. Retrieved November 3, 2021, from <https://e-estonia.com/solutions/e-governance/>.
- . 2017. How Estonia became a global heavyweight in cyber security. e-Estonia. June 14. <https://e-estonia.com/how-estonia-became-a-global-heavyweight-in-cyber-security/>.
- ERP Latam. 2020. Las aduanas del Mercosur están conectadas por blockchain. Portal ERP Latam. March 11. <https://latam.portalerp.com/las-aduanas-del-mercosur-estan-conectadas-por-blockchain>.
- European Commission. 2007. Fiscal Blueprints: A Path to a Robust, Modern and Efficient Tax Administration.

- . 2016. European Commission launches EU-U.S. Privacy Shield. European Commission Press Release July 12. Available at https://ec.europa.eu/commission/presscorner/detail/en/IP_16_2461.
- European Parliament, Committee on Legal Affairs. 2017. Report with Recommendations to the Commission on Civil Law Rules on Robotics. 64.
- EUROSAI. 2008. Benchmarking of Tax Administrations: Report of the EUROSAI Study Group. Available at <https://www.euroesai.org/handle404?exporturi=/export/sites/euroesai/content/documents/training/training-committe/Benchmarking-of-Tax-AdministrationFinal-Report.pdf>.
- EY. 2017. Tax authorities are going digital. EY. Available at https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/digital/ey-tax-authorities-are-going-digital.pdf.
- . 2019. How Russia is using technology to transform tax administration. November 15. Available at https://www.ey.com/en_cz/tax/how-russia-is-using-technology-to-transform-tax-administration.
- Faúndez-Ugalde, A. 2019. La tutela jurisdiccional efectiva con relación al derecho a ser juzgado dentro de un plazo razonable en procedimientos tributarios: experiencia comparada entre Chile y Brasil frente a la Convención Americana de Derechos Humanos. *Revista de Investigações Constitucionais* 6(3): 687–702. Available at <https://doi.org/10.5380/rinc.v6i3.64284>.
- Faúndez-Ugalde, A., R. Mellado-Silva, and E. Aldunate-Lizana. 2010. Use of artificial intelligence by tax administrations: An analysis regarding taxpayers' rights in Latin American countries. *Computer Law and Security Review* 38. Available at <https://doi.org/10.1016/j.clsr.2020.105441>.
- FTS of Russia and Forum on Tax Administration. 2017. Tax Administration Digital Maturity Assessment Model: Big Data, Portals and Natural Systems. Survey results. Paris: OECD Publishing.
- Gallagher, M. and A. Jacobs. 2009. Lowering Taxpayer Compliance Costs. *Developing Alternatives* 13(1).
- GAO (U.S. Government Accountability Office). 2005. Data Mining: Agencies Have Taken Key Steps to Protect Privacy in Selected Efforts, but Significant Compliance Issues Remain. August 29. Available at <https://www.gao.gov/products/gao-05-866>.
- Gill, J. 2003. The Nuts and Bolts of Revenue Administration Reform. Washington, DC: World Bank.
- González Mata, E., I. Romero, and R. Padilla. 2019. Buenas prácticas aplicadas en países de América Latina para reducir la evasión por saldos a favor en el IVA. Santiago: CEPAL. Available at <https://www.cepal.org/es/publicaciones/44953-buenas-practicas-aplicadas-paises-america-latina-reducir-la-evasion-saldos-favor>.
- Hasseldine, J. 2008. The Search for Best Practice in Tax Administration. In C. Evans and M. Walpole (eds), *Tax Administration: Safe Harbours and New Horizons*. Lancashire, UK: Fiscal Publications.

- . 2010. The Administration of Tax Systems. *International Studies Program Working Paper* 10(21).
- Hatfield, M. 2018. Cybersecurity and Tax Reform. *Indiana Law Journal* 93(4): 1161.
- Houser, K. A. and D. Sanders. 2017. The Use of Big Data Analytics by the IRS: Efficient Solutions or the End of Privacy as We Know It? *Vanderbilt Journal of Entertainment and Technology Law* 19(4): 817–872.
- ICAEW. 2019. Digitalisation of tax: International perspectives. London: ICAEW. Available at <https://www.icaew.com/-/media/corporate/files/technical/technology/thought-leadership/digital-tax.ashx>.
- IDB. 2013. State of the Tax Administration in Latin America: 2006–2010. Washington, DC: IDB. Available at <https://publications.iadb.org/en/state-tax-administration-latin-america-2006-2010>.
- . 2016. Guatemala mejorará la gestión tributaria y la transparencia con apoyo del BID. Press Release. November 2. Washington, DC: IDB.
- . 2021. Transformación Digital de las Administraciones Tributarias en América Latina: Modelo de Madurez Digital. [Webinar] June 15–17. IDB.
- IMF, CIAT, IOTA, and OECD. Undated. International Survey on Revenue Administration (ISORA). Retrieved November 10, 2021, from <https://data.rafit.org/?sk=ba91013d-3261-42f8-a931-a829a78cb1ec>.
- Institute for Business in the Global Context. 2018. Digital Evolution Index: Latin America & Caribbean Edition. Boston: The Fletcher School, Tufts University.
- IRS. 2019. IRS Integrated Modernization Business Plan. Washington, DC: IRS. Available at <https://www.irs.gov/pub/irs-pdf/p5336.pdf>.
- ITC (Secretariat implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit [GIZ] GmbH) and KfW (Kreditanstalt Für Wiederaufbau [German Development Bank]). 2015. Information Technology in Tax Administration in Developing Countries. Available at <https://www.taxcompact.net/resource/information-technology-tax-administration-developing-countries>.
- Jacobs, A. et al. 2013. Detailed Guidelines for Improved Tax Administration in Latin America and the Caribbean. Washington, DC: USAID. Available at https://2017-2020.usaid.gov/sites/default/files/LAC_TaxBook_Entire%20Book%20-%20ENGLISH.pdf.
- Jenkins, G. 1996. Information Technology and Innovation in Tax Administration. The Hague/London/Boston: Kluwer Law International.
- Jimenez, G., N. Mac an tSionnaigh, and A. Kamenov. 2013. Information Technology for Tax Administration. Washington, DC: USAID.
- Junquera-Varela, R. F., R. Awasthi, O. Balabushko, and A. Nurshaikova. 2019. Thinking Strategically about Revenue Administration Reform. World Bank Group Discussion Paper

- No. 4. Washington, DC: World Bank. Available at <https://openknowledge.worldbank.org/entities/publication/23dbaf7b-5757-54d6-a7c4-b6e211a4c273>.
- Kastillo Lopez, L. F. 2018. Construcción de un modelo de riesgo de precios de transferencia en Ecuador. July 23. Available at <https://www.ciat.org/construccion-de-un-modelo-de-riesgo-de-precios-de-transferencia-en-ecuador/>.
- Kattel, R. and I. Mergel. 2019. Estonia's Digital Transformation: Mission Mystique and the Hiding Hand. In M. Compton and P. Hart (eds), *Great Policy Successes*. Oxford: Oxford University Press. Available at <https://doi.org/10.1093/oso/9780198843719.003.0008>.
- Kershaw, R. (Commissioner, Australian Federal Police). 2020. Evidence to Senate: Australian Government's response to the COVID-19 pandemic. Senate Select Committee on COVID-19.
- Kidd, M. 2010. Revenue Administration: Functionally Organized Tax Administration. *Technical Notes and Manuals* 2010(10): 1. Available at <https://doi.org/10.5089/9781462332380.005>.
- Kuijper, B., T. Cameron, and Z. Szatmari. 2020. Technology-Enabled Tax Compliance. *Bulletin for International Taxation* 74(10).
- Laid, V. 2018. Think digitally, act meaningfully: Digital transformation in Estonia. In IOTA, *Impact of Digitalisation on the Transformation of Tax Administrations*. Budapest: IOTA. Available at <https://iota-tax.org/publication/impact-digitalisation-transformation-tax-administrations-0>.
- Lemetyuynen, I. and V. Sergeeva. 2018. Russia: Tax monitoring becomes popular in Russia. *International Tax Review*. Available at <https://www.internationaltaxreview.com/article/b1f7n2fl6c3gkm/russia-tax-monitoring-becomes-popular-in-russia>.
- Lipniewicz, R. 2017. Tax Administration and Risk Management in the Digital Age. *Information Systems in Management* 6(1): 26-37. Available at <https://doi.org/10.22630/ISIM.2017.6.1.3>.
- Liu, H.-W., C.-F. Lin, and Y.-J. Chen. 2019. Beyond *State v Loomis*: Artificial intelligence, government algorithmization and accountability. *International Journal of Law and Information Technology* 27(2): 122-141. Available at <https://doi.org/10.1093/ijlit/eaz001>.
- Lopez-Pablos, R. 2013. Elementos de ingeniería de explotación de la información aplicados a la investigación tributaria fiscal.
- Lückeheide, S., J. D. Velásquez, and L. Cerda. 2007. Segmentación de los contribuyentes que declaran IVA aplicando herramientas de clustering. *Revista de Ingenieria de Sistemas* 87-110.
- Mancilla Rendon, E. 2010. Auditoria tributaria de los precios de transferencia de las multinacionales en Mexico. *Cuadernos de Contabilidad* 11(29): 473-492.
- Mansel, T. 2013. How Estonia Became E-stonia. *BBC News*. May 16. <https://www.bbc.com/news/business-22317297>.
- Marr, C. and C. Murray. 2016. IRS Funding Cuts Compromise Taxpayer Service and Weaken Enforcement. Center on Budget and Policy Priorities. April 4. Available at <https://www>

[.cbpp.org/research/federal-tax/irs-funding-cuts-compromise-taxpayer-service-and-weaken-enforcement](https://www.cbpp.org/research/federal-tax/irs-funding-cuts-compromise-taxpayer-service-and-weaken-enforcement).

- Matteucci, S. C. 2020. The Rise of Technological Administration and the Ragged Route Towards a Digital Administrative Law. In D. Sorace, L. Ferrara, and I. Piazza (eds), *The Changing Administrative Law of an EU Member State: The Italian Case*. Cham, Switzerland: Springer. Available at https://link.springer.com/chapter/10.1007/978-3-030-50780-0_8.
- Mickoleit, A. 2014. Social Media Use by Governments: A Policy Primer to Discuss Trends, Identify Policy Opportunities and Guide Decision Makers (Vol. 1-26). Paris: OECD Publishing. Available at <https://doi.org/10.1787/5jxrcmghmk0s-en>.
- Ministerio de Hacienda Costa Rica. 2020. Manual Operativo: Proyecto de Mejora de la Gestión Fiscal (Hacienda Digital para el Bicentenario). Available at <https://www.hacienda.go.cr/Documentos/MasDetalles/HaciendaDigital/Documentos%20de%20Interes/Manual%20Operativo/16-12-2021%20V2%20MO%20-%20Proyecto%20Hacienda%20Digital%20del%20Bicentenario.pdf>.
- Mulvaney, M. 2018. Shifting from Low-Value to High-Value Work. Memorandum for Heads of Executive Departments and Agencies. August 27. Available at <https://www.whitehouse.gov/wp-content/uploads/2018/08/M-18-23.pdf>.
- Nurmandi, A. et al. 2018. To what extent is social media used in city government policy making? Case studies in three ASEAN cities. *Public Policy and Administration* 17(4): 600–618.
- OECD. Undated. OECD Tax Administration Maturity Model Series. OECD Forum on Tax Administration. Retrieved November 3, 2021, from <https://www.oecd.org/tax/forum-on-tax-administration/about/maturity-model-series.htm>.
- . 2001. General Administrative Principles – GAP001 Principles of Good Tax Administration. Paris: OECD Publishing.
- . 2004. Compliance Risk Management: Managing and Improving Tax Compliance. Guidance Note. Paris: OECD Publishing. Available at <https://www.oecd.org/tax/administration/33818656.pdf>.
- . 2010. Tax Reference Model—Application Software Solutions to Support Revenue Administration in Selected Countries. Information Note. Paris: OECD Publishing.
- . 2011a. Social Media Technologies and Tax Administration. Information Note. Paris: OECD Publishing. Available at <https://www.oecd.org/tax/administration/48870427.pdf>.
- . 2011b. Tax Administration in OECD and Selected Non-OECD Countries: Comparative Information Series 2010. Paris: OECD Publishing.
- . 2012. Working smarter in revenue administration—Using demand management strategies to meet service delivery goals. Information Note. Paris: OECD Publishing. Available at <https://www.oecd.org/tax/forum-on-tax-administration/publications-and-products/service/49428187.pdf>.

- . 2013. Tax Administration 2013—Comparative Information on OECD and Other Advanced and Emerging Economies. Paris: OECD Publishing. Available at <https://www.oecd.org/tax/administration/tax-administration-2013.htm>.
- . 2014. Increasing Taxpayers' Use of Self-Service Channels. Paris: OECD Publishing. Available at <https://doi.org/10.1787/9789264223288-en>.
- . 2016a. Rethinking Tax Services: The Changing Role of Tax Service Providers in SME Tax Compliance. Paris: OECD Publishing. Available at <https://doi.org/10.1787/9789264256200-en>.
- . 2016b. Technologies for Better Tax Administration: A Practical Guide for Revenue Bodies. Paris: OECD Publishing. Available at <https://doi.org/10.1787/9789264256439-en>.
- . 2017. Special Feature: Electronic services in tax administration. In OECD, *Revenue Statistics in Asian Countries 2017: Trends in Indonesia, Japan, Kazakhstan, Korea, Malaysia, the Philippines and Singapore*. Paris: OECD Publishing. Available at <https://doi.org/10.1787/9789264278943-4-en>.
- . 2019a. Introducing a Commercial Off-The-Shelf Software Solution. The experience of the Finnish Tax Administration. Paris: OECD Publishing. Available at www.oecd.org/tax/forum-on-tax-administration/publications-and-products/introducing-a-commercial-off-the-shelf-software-solution.htm.
- . 2019b. Tax Administration 2019: Comparative Information on OECD and other Advanced and Emerging Economies. Paris: OECD Publishing. Available at <https://doi.org/10.1787/74d162b6-en>.
- . 2019c. Tax Compliance Burden Maturity Model. Paris: OECD Publishing. Available at www.oecd.org/tax/forum-on-tax-administration/publications-and-products/tax-compliance-burden-maturity-model.htm.
- . 2019d. Tax Debt Management Maturity Model. Paris: OECD Publishing. Available at www.oecd.org/tax/forum-on-tax-administration/publications-and-products/tax-debt-management-maturity-model.htm.
- . 2019e. Measuring the Digital Transformation: A Roadmap for the Future. Paris: OECD Publishing. Available at <https://doi.org/10.1787/9789264311992-en>.
- . 2020a. Confidentiality and Information Security Management Toolkit. Paris: OECD Publishing. Available at <https://www.oecd.org/tax/transparency/documents/confidentiality-and-information-security-management-toolkit.htm>.
- . 2020b. Tax Administration 3.0: The Digital Transformation of Tax Administration. Paris: OECD Publishing. Available at <https://www.oecd.org/tax/forum-on-tax-administration/publications-and-products/tax-administration-3-0-the-digital-transformation-of-tax-administration.htm>.
- . 2020c. Tax Crime Investigation Maturity Model. Paris: OECD Publishing. Available at <http://www.oecd.org/tax/crime/tax-crime-investigation-maturity-model.htm>.

- . 2021a. Commissioner Conversations: Digital Transformation—The View from China. Interview between W. Jun and P. Saint-Amans. Paris: OECD Publishing. Available at <https://www.oecd.org/tax/forum-on-tax-administration/publications-and-products/commissioner-conversations/digital-transformation-the-view-from-china.pdf>.
- . 2021b. Enterprise Risk Management Maturity Model. Paris: OECD Publishing. Available at <http://www.oecd.org/tax/forum-on-tax-administration/publications-and-products/enterprise-risk-management-maturity-model.htm>.
- . 2021c. Tax Administration 2021: Comparative Information on OECD and Other Advanced and Emerging Economies. Paris: OECD Publishing. Available at <https://doi.org/10.1787/cef472b9-en>.
- . 2021d. Taxing Wages 2021. Paris: OECD Publishing. Available at <https://doi.org/10.1787/83a87978-en>.
- OECD and IDB. 2016. Government at a Glance: Latin America and the Caribbean 2017. Paris: OECD Publishing. Available at <https://doi.org/10.1787/9789264265554-en>.
- OECD et al. 2020. Latin American Economic Outlook 2020: Digital Transformation for Building Back Better. Paris: OECD Publishing. Available at <https://doi.org/10.1787/e6e864fb-en>.
- OECD, Inter-American Center of Tax Administrations (CIAT), Economic Commission for Latin America and the Caribbean (ECLAC), and Inter-American Development Bank (IDB). 2021. Revenue Statistics in Latin America and the Caribbean 2021. Paris: OECD Publishing. Available at <https://doi.org/10.1787/96ce5287-en-es>.
- Ołowska, M., P. Peshori, and S. Lan. 2020. The Digitalization of Tax Administration in China, India and Korea (Rep.) in the Fourth Industrial Revolution. *Bulletin for International Documentation* 74(8): 18.
- Palomino Guerrero, M. 2022. Inteligencia artificial: Un mecanismo para frenar la evasión fiscal sin vulnerar los derechos del contribuyente. *Cuestiones constitucionales* 46: 213–236. Available at <https://doi.org/10.22201/ij.24484881e.2022.46.17053>.
- Receta Federal do Brasil. 2021. Receita Federal amplia o acesso à declaração pré-preenchida do IRPF/2021. Available at <https://www.gov.br/receitafederal/pt-br/assuntos/noticias/2021/marco/receita-federal-amplia-o-acesso-a-declaracao-pre-preenchida-do-irpf-2021>.
- Redondo Sánchez, J. F. 2019. Sistema de Notificaciones Electrónicas. Experiencias en América Latina y España. Working Paper No. 1. Panama City: CIAT. Available at https://www.ciat.org/Biblioteca/DocumentosdeTrabajo/2019/DT_01_2019_Redondo.pdf.
- Reyes-Tagle, G., O. Santin, and L. F. Cadena. 2021. Digital Maturity Index: How to measure digital transformation progress in tax administrations. *Recaudando Bienestar* blog. June 25. Available at <https://blogs.iadb.org/gestion-fiscal/en/digital-maturity-index-how-to-measure-digital-transformation-progress-in-tax-administrations/>.

- Rodionov, I. 2015. Russian Cooperative compliance program – Tax monitoring. WU Cooperative Compliance Program.
- SAT-G. 2021. SAT lanza nueva “APP FEL” para facilitar la emisión de facturas desde teléfonos celulares. Portal SAT. March 8. Available at <https://portal.sat.gob.gt/portal/noticias/sat-lanza-nueva-app-fel/>.
- SAT-M. Undated. Consulta las contribuciones federales que puedes pagar con línea de captura. Retrieved April 12, 2021, from <https://www.sat.gob.mx/declaracion/98410/contribuciones-que-puedes-pagar-con-linea-de-captura>.
- . 2018. Servicios Fiscales Digitales en México: Evolución. Available at <https://www.amexipac.org/assets/serviciosfiscalesdigitalesen-mexico-evolucion-2018.pdf>.
- Schlotterbeck, S. 2017. Tax Administration Reforms in the Caribbean: Challenges, Achievements, and Next Steps. Working Paper No. 17/88. Washington, DC: International Monetary Fund.
- Seco, A. 2013. A Little More about ICTs and Tax Administration. CIAT blog. January 28. Available at <https://ciat.org/a-little-more-about-icts-and-tax-administration/?lang=en>.
- Seco, A., and A. Muñoz Miranda. 2019. Asistentes conversacionales virtuales en las administraciones tributarias: Principios, modelos y recomendaciones. Discussion Paper No. 713. Washington, DC: Inter-American Development Bank. Available at <https://doi.org/10.18235/0001901>.
- Senate Finance and Public Administration Committees (Australia). 2018. Digital Delivery of Government Services. Available at https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Finance_and_Public_Administration/digitaldelivery/Report.
- Shome, P. 1999. Taxation in Latin America: Structural Trends and Impact of Administration. IMF Working Paper 1999(019). Washington, DC: International Monetary Fund. Available at <https://doi.org/10.5089/9781451843729.001>.
- SII. 2018. Plan Estratégico 2018–2022.
- . 2021. Plan de Gestión de Cumplimiento Tributario (PGCT) 2021. Available at https://www.sii.cl/sobre_el_sii/pgct2021_completo.pdf.
- Soria, D. A. 2017. E-Gobierno Fiscal Corporativo. *Revista de Administración Tributaria* 42: 19–34.
- STA (China). 2021. Opinions on Further Deepening the Reform of Tax Collection and Administration. Available at <https://www.chinatax.gov.cn/eng/c101269/c5165500/content.html>.
- SUNAT. 2020. Plan de Gobierno Digital 2020–2022. Available at <https://www.sunat.gob.pe/legislacion/superin/2020/anexo-236-2020.pdf>.
- Supreme Court of Chile. 2014. Industrial Molina Limitada v Servicio de Impuestos Internos. rol n 5.165–2013.
- Talierto, R. R. 2004. Administrative Reform as Credible Commitment: The Impact of Autonomy on Revenue Authority Performance in Latin America. *World Development* 32(2): 213–232.

- Tansey, D. 2019. The Governance Brief. Tax Administration Information Systems: Concept, Design, and Implementation. Manila: Asian Development Bank. Available at <https://www.adb.org/publications/tax-administration-information-systems>.
- Taxpayer Advocate Service. 2020. Objectives Report to Congress, Fiscal Year 2021. Available at <https://www.taxpayeradvocate.irs.gov/reports/2021-objectives-report-to-congress/full-report/>.
- Thuronyi, V. T. 1996. Drafting Tax Legislation. In V. T. Thuronyi (ed), *Tax Law Design and Drafting, Volume 1*. Washington, DC: International Monetary Fund. Available at <https://www.imf.org/external/pubs/nft/1998/tlaw/eng/index.htm>.
- Treasury Inspector General for Tax Administration. 2011. The Interactive Tax Law Assistant Helps Assistants Provide Accurate Answers to Taxpayer Inquiries. 2011-40-043.
- UN, ECLAC, and Agencia Española de Cooperación Internacional (eds). 2017. Fiscal Panorama of Latin America and the Caribbean: Mobilizing resources to finance sustainable development. New York: United Nations.
- UN General Assembly. 2014. A/RES/68/167 Resolution adopted by the General Assembly on 18 December 2013: The right to privacy in the digital age.
- U.S. Supreme Court. 1982. Harlow v. Fitzgerald, 457 US 800, 816.
- Végh, G. 2018. Tax Administration Good Governance. *EC Tax Review* 27(1): 48–60.
- World Bank. 2019. The Administrative Review Process for Tax Disputes: Tax Objections and Appeals in Latin America and the Caribbean—A Toolkit. Working Paper. Washington, DC: World Bank. Available at <http://documents.worldbank.org/curated/en/197591554404274707/The-Administrative-Review-Process-for-Tax-Disputes-Tax-Objections-and-Appeals-in-Latin-America-and-the-Caribbean-A-Toolkit>.

