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Innovation, Digitalization and Technology Index INDITEC 2023

*The digital transformation of Tax Administrations
in the period affected by the COVID-19 pandemic
(Based on data from ISORA 2022 Survey)*



Dalmiro Morán
Santiago Díaz de Sarralde Miguez



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Executive summary

- This document presents the second edition of the **Tax Administration Innovation, Digitalization and Technology Index (INDITEC)**. Like its original version, this tool seeks to provide a detailed and synthetic image of the status of Tax Administrations (TAs) around the world in terms of the incorporation of technological innovations to improve tax compliance and statistical information management, the digital transformation of operational processes and the strategic orientation of available financial and human resources. To this end, it takes advantage of updated information from the **International Survey on Revenue Administration (ISORA)**, collected during 2022 with individual data for fiscal years 2018, 2019, 2020 and 2021.
- Firstly, the construction of synthetic tax administration indexes requires the definition of a series of methodological issues related to the **determination of the dimensions of analysis and the selection of the most representative variables**. This then includes a brief explanation a) of the statistical treatment of the different components of each index, b) of the selection of the figures available for different years, and c) of the strategy for aggregating all the elements in a synthetic index of a global nature.
- The identified dimensions of analysis (on which partial indexes are calculated) are four. The first is called **“technological innovation”** and includes variables referred to the effective use of innovative techniques and tools oriented to tax management such as data analytical science, cloud computing, artificial intelligence, distributed ledger technology (Blockchain), application programming interfaces (APIs), digital identification technologies, virtual assistants, whole-of-government identification systems, and robotic automation of processes.
- The second dimension is linked to the adoption of advanced tools aimed at **“compliance improvement”** and encompasses variables related to the use/implementation of cooperative approaches specifically targeting either large taxpayers and/or high net worth individuals, behavioral insight methodologies or

techniques, mandatory implementation of electronic invoicing (for a group or all taxpayers), requirements for using electronic fiscal devices (for a group or all taxpayers), as well as the pre-filled returns by the own TAs (with different variants).

- The third dimension, called “**operational digitalization**”, refers to the digital transformation of the main internal processes of TAs (registration, tax returns processing, payment of liabilities), especially those where the availability of digital means is considered a relative advantage over more traditional practices or methods (such as face-to-face procedures). This includes electronic payment ratios, electronic filing ratios for the main taxes (Value Added Tax and Income Taxes -corporate and personal), the effective use of digital contact channels for taxpayer services, and the availability of digital tax registration channels.
- A last dimension, linked to “**resources and budget**”, aims to reflect the availability and effective use of human and economic resources available to each TA. The included variables are the staff’s academic training or education (with undergraduate and graduate university degrees), the number of inhabitants and active taxpayers in Personal Income Tax per employee, the operating expenditures on ICT relative to the GDP and to the TA’s operating budget, the level of capital expenditures and the total budget (both as a percentage of GDP), and the recurrent cost of collection as a measure of the relationship between collected tax revenues and total operating expenditures.
- Once the dimensions to be used were defined and the ISORA variables selected, some **statistical adjustments were done to ensure a homogeneous and proportional weighting** of each of them. In some cases, the data were normalized with a standard procedure in order to construct a partial index for each of the four dimensions. In addition, criteria were defined for the **selection of available data for two reference fiscal periods (2019 and 2021)**. Then, **the aggregation procedure in the INDITEC index was performed by assigning an equivalent relative weight** to each of the partial indexes. The resulting equation, for each country “i” (174) at the two points in time “t” (2019 and 2021), is as follows:

$$INDITEC_{it} = 1/4 \times Innovation_{it} + 1/4 \times Compliance_{it} + 1/4 \times Digitalization_{it} + 1/4 \times Resources_{it}$$

- The calculation of a **second alternative synthetic index (INDITEC 2)** was also proposed, with the sole difference of excluding the variables included in the “resources and budget” dimension (maintaining equivalent weightings) and with the objective of testing the robustness and statistical consistency of the original global index. In mathematical notation, INDITEC 2 is defined as follows:

$$INDITEC\ 2_{it} = \frac{1}{3} \times Innovation_{it} + \frac{1}{3} \times Compliance_{it} + \frac{1}{3} \times Digitalization_{it}$$

- The **overall results for the universe of the 174 jurisdictions participating in ISORA 2022** allow an analysis of the levels and gaps observed (for the most recent fiscal year) and the changes recorded between the situation before (2019) and after (2021) the COVID-19 pandemic. Thus, the “technological innovation” dimension shows the smallest values, with an average index that went from 0.33 in 2019 to 0.38 in 2021. The overall performance is somewhat higher for “compliance improvement”, where there was also an improvement from 0.36 to 0.43 between the same years. The average figures for the index linked to “operational digitalization” show an improvement from 0.51 to 0.54 between 2019 and 2021. The highest average index corresponds to the “resources and budget” dimension where, however, is where the only (slight) drop is recorded between these periods (from 0.63 to 0.62). Finally, **the INDITEC index for the “ISORA universe” stands at 0.50 for fiscal year 2021, with a growth compared to 2019 (0.46), which comes from the improvement of the index in 121 of the 174 countries surveyed.** In addition, the response rate has also improved between 2019 and 2021 (87% vs. 91%) for the set of 30 variables that make up the INDITEC, increasing its statistical accuracy.
- The analysis by different country groupings shows some interesting results. For example, the **averages calculated when disaggregated by geographic region** reveal large gaps in terms of the use/ implementation of innovative instruments for tax management and also in terms of progress in operational digitalization. The region with the best relative performance is Europe and Central Asia, which shows figures that are higher than those of other regions in the four dimensions analyzed. The decline in the area of resource and budget management stands out, where in 2019 the highest average values were already recorded in most of the regions. This contrasts with what was observed in the “operational digitalization” dimension, where the progress between 2019 and 2021 is unanimous for all of them.

- Following the World Bank’s classification criteria, a clear positive association has been confirmed in which the group **averages for the different indexes grow with income level** and reach their maximum in the group of High-Income countries. The gaps are most noticeable in the dimensions of technological innovation and operational digitalization, and somewhat narrower in “compliance improvement”. In these three areas, all the averages calculated according to income level show an improvement in 2021, while the “resources and budget” dimension goes against the trend with slight drops, although this does not necessarily have a negative connotation as it can have different explanations. The conglomerate of CIAT member countries shows better performance in the four dimensions compared to the rest of the countries, with changes in line with global trends. Something similar is found for the OECD countries compared to the rest of the countries in ISORA 2022, with more significant differences in all dimensions.
- All the trends identified are confirmed when the **indexes are aggregated by dimensions (with equivalent weights) and combined in the INDITEC synthetic index**. By region, while Europe and Central Asia (0.64) and North America (0.58) show average values above the global average in 2021, Latin America and the Caribbean is just below (0.49) and other regions lag behind. All regions, except North America, showed an improvement between 2019 and 2021 in the average INDITEC value. By income level, there is a clear positive relationship with the INDITEC averages, with a very significant gap in 2021 between the Low Income (0.37) and High Income (0.58) groups of countries, although there has been an improvement in all cases with respect to the figures for 2019. CIAT (0.59) and OECD (0.68) countries show much higher INDITEC averages in 2021 compared to the rest of the jurisdictions, with significant progress compared to the pre-pandemic situation.
- In addition, **the alternative INDITEC 2 index was calculated at the global level and for different groups of countries**, isolating the effect of the dimension linked to the availability and use of resources and the total budget. The mean values are somewhat lower than for the original version in all cases, although the trends noted above are maintained when the data are analyzed by geographic region and income level. The only exception to this regularity was the group of OECD member countries, which is explained by the relatively low incidence, on average, of the “resources and budget” dimension in OECD jurisdictions.

- The construction of INDITEC for each of the countries participating in ISORA 2022 provides the possibility of **determining an individual ranking and distributing the total number of countries into four quartiles (of 43 or 44 countries) according to the value of the synthetic index.** This distribution between quartiles is very different when disaggregated by country groupings. For example, the majority of countries in East Asia and Pacific, South Asia and Sub-Saharan Africa are concentrated in quartiles 1 and 2, while most countries in Europe and Central Asia and North America are in quartiles 3 and 4. In 2021, more than 70% (28 out of 38) of CIAT countries are located in quartiles 3 and 4 (in 2019 there were 26), which is magnified for OECD countries where nearly 95% of them fall within those two highest quartiles with no member country located in INDITEC quartile 1.
- After comparing the average values calculated for different groupings of jurisdictions, **the individual information is presented in detail by dimensions with emphasis on the 38 CIAT member countries** that participated in the most recent edition of ISORA 2022. In the area of technological innovation and for year 2021, Brazil (0.94), Kenya (0.83), Argentina, France or Mexico (0.78 in all three cases) stand out above the rest, proving, in addition, progress in 21 of the 38 countries with respect to 2019. Regarding the incorporation of tools to improve tax compliance, Argentina, Ecuador, and Kenya stand out, reaching the maximum feasible value (1.00), with 15 countries improving their performance in this dimension between 2019 and 2021. Meanwhile, the best results in the index focused on the operational digitalization processes appear in Argentina, Brazil, Costa Rica, Ecuador, Spain, Italy, Peru, Portugal, and the Dominican Republic, all with figures above 0.90. In this area, a large majority of cases (25 out of 38) achieved increases in the partial index between these fiscal years. Finally, the “resources and budget” dimension shows a smaller dispersion of figures (between 0.47 for Kenya and 0.87 for the Dominican Republic) and, in turn, a greater proportion of countries with a decline in the indicator at the exit of the pandemic (22 of the 38 countries).
- From the calculation of the INDITEC index at the individual level and the ordering of the 174 ISORA 2022 countries within a global ranking, it emerges that **most CIAT members stand out both for their relative position and for the improvements achieved between 2019 and 2021** (28 of 38 countries fall in the two highest quartiles and 27 of them increased the INDITEC level with respect to the pre-pandemic situation). However, the gap between countries is very wide by 2021, ranging from a minimum in Bermuda (0.21) to a maximum in Argentina (0.85). In several cases, the most recent figures exceed both the average for the ISORA universe and even that of OECD member countries. The cases of Brazil, Kenya, Spain, Ecuador, Peru, Italy, and Mexico stand out, with INDITEC figures above 0.75 in the most recent period.

- Also, in order to test the statistical robustness of the individual results, **an alternative index (INDITEC 2) more specifically focused on the technological aspects associated with the digital transformation of TAs was calculated.** It is observed that, for countries with relatively low scores on the original INDITEC, the INDITEC 2 values result somewhat lower than the former; in contrast, for countries with high INDITEC levels, the alternative version of the index results higher in all cases. This is explained by the lower relative dispersion of the “resources and budget” dimension (which is not included in the INDITEC 2 definition), which causes an increase in the gaps between countries but, in general, does not alter the trends identified in terms of the levels and their order in the original INDITEC ranking.
- In short, this new edition of the INDITEC index, in addition to updating its results with the most recent information available, manages to **ratify its validity as a practical method for diagnosing and benchmarking TAs around the world in terms of digital transformation in its different dimensions.** As with any method based on information collected through a standardized survey, it may have certain relative advantages and disadvantages compared to other existing alternatives, along with some statistical limitations that make it necessary to interpret its results with due caution. Nevertheless, the calculation of this synthetic index makes it possible to: i) identify trends and stylized facts in specific aspects, ii) establish frames of reference for the countries participating in ISORA, and iii) determine the existing gaps between them in different areas of the functioning of their respective TAs. In turn, from this edition onwards, the possibility of developing an analysis with a time perspective -through which the encouraging progress made, globally and particularly for CIAT countries, in emerging from the COVID-19 pandemic has been verified-, consolidates and highlights the usefulness and potential of INDITEC as an international benchmarking tool.

Introduction

In a recent paper, Barreix et al. (2023) analyze the profound transformation that has been observed globally in the area of tax administration. Focusing on Latin American and Caribbean countries, and while warning about the asymmetries between them, these authors argue that the changes have been possible thanks to two specific advances. On the one hand, the introduction of regulatory frameworks to guarantee the administrative, financial, and operational autonomy of the respective tax collection agencies. On the other hand, and in a complementary manner, the massive incorporation of information and communication technologies (ICTs), which have allowed the improvement of each of the critical areas of these entities, contributing to the achievement of their fundamental objectives.

Indeed, during the last decade, Tax Administrations (TAs) in all latitudes have been realizing -and have begun to capitalize on- the great potential of the most advanced technological innovations (such as data analytics or artificial intelligence, among others) to strengthen their operational capabilities. This includes the possibility of advancing in the automation of different processes as well as in the efficient processing of a growing amount of statistical information flowing into these agencies, contributing to a better management of tax risks. In turn, the adoption of different ICTs as strategic tools would allow not only a more efficient use of available financial and human resources, but also an adequate response to the varied preferences of taxpayers in each case (CIAT, 2020).

Today, all these innovative practices applied to tax administration have become real global¹ trends. However, the great diversity of particular experiences in different countries represents a challenge when trying to assess the pace, intensity and relative success of these transformations at the international level from a comparative perspective. Even more so if the aim is to synthesize the relative state of affairs of a given jurisdiction in different areas or dimensions of analysis that are not always recognizable or quantifiable.

1 This is evidenced by the recent publication of OECD (2023), “Tax Administration 2023: Comparative Information on OECD and Other Advanced and Emerging Economies”, as well as a recent CIAT document that can be considered as complementary to the present work: Garcimartín and Díaz de Sarralde Miguez (2024), [“Overview of Tax Administrations in CIAT Countries. Results of the ISORA 2022 Survey”](#) (spanish version, soon in English).

In response to this need, CIAT has promoted and advanced in the construction of the “Innovation, Digitalization and Technology Index (INDITEC)”, which aims at providing a global indicator of the relative degree of progress of TAs in the incorporation of technical innovations (aimed at improving compliance as well as efficient information processing), digitalization of central operations (among others, the handling of tax returns, service channels and modalities of effective payment of tax liabilities), and management of technological, human and financial resources (both in absolute and relative terms).

As in its original version, the INDITEC 2023 calculations use the International Survey on Tax Administration (ISORA) as a fundamental input. The most recent edition of this powerful information tool, collected in mid-2022, has brought together a large amount of standardized data provided directly by the TAs themselves from a total of 174 jurisdictions around the world. The annual figures available, which cover the period 2018-2021, update and strengthen the previous results and, in addition, provide the possibility to make comparisons, on average and individually, between two clearly different moments, that is, before and after the COVID-19 pandemic. It is known that, especially since the second quarter of 2020, most TAs were forced to implement a series of unprecedented responses to ensure and facilitate tax compliance which, in several cases, could have accelerated digital transformation processes that were incipient or planned prior to that extraordinary event. The results expected from INDITEC 2023 could provide indications of these impacts at the global, regional, and individual country levels.

With this main objective as a premise, this document is structured as follows. After this brief introduction, the first section describes and updates the methodology used in the construction of the INDITEC synthetic index, based on the most recent information from ISORA 2022 and on a series of statistical criteria to ensure the homogeneity of the figures collected from all the jurisdictions participating in this project. The second section of the paperwork presents and analyzes the main results of INDITEC 2023, both by dimensions of analysis, at the global consolidated level and in two alternative formulations. The calculations are presented for the averages of different groupings of jurisdictions (mainly by geographic region and income level) and for individual cases, with a special focus on CIAT member countries. The emphasis is on identifying quantitative differences between a pre-pandemic (2019) and post-pandemic (2021) time reference. Finally, the paper concludes with some brief comments on the main results and the potential of INDITEC as a synthetic indicator of the digital transformation of TAs, as well as a statistical annex with disaggregated information for the countries participating in the latest edition of ISORA.

1 INDITEC index calculation methodology

In general, the construction of a synthetic indicator requires specifying a series of methodological criteria aimed at homogenizing and condensing a large amount of diverse information. This task usually implies the need to process and assimilate different sources of information, with specific variables and analytical categories, which can be complex in most cases.

In this case, the so-called Innovation, Digitalization and Technology Index of TAs (INDITEC) has the advantage of relying on the joint statistical project ISORA², whose ongoing efforts have resulted in a large database collected through a standardized survey, which is completed by the agencies themselves and then systematized in a freely accessible digital platform. Its most recent edition, with information available for 174 jurisdictions³ and data corresponding to four fiscal⁴ years (2018, 2019, 2020 and 2021), has allowed the identification and analysis of a series of regional and global trends in tax administration, which can be consulted in a document also published by CIAT such as the “Overview of Tax Administrations in CIAT Countries - Results from ISORA 2022 Survey” (Garcimartín and Díaz de Sarralde Miguez, 2024).

Therefore, the availability of a large number of qualitative and quantitative variables referring to the TAs participating in ISORA offers the possibility of constructing synthetic indicators on different central aspects of these agencies. These instruments, then, can be used not only for their comparative evaluation but also for making preliminary diagnoses in different dimensions, illustrating the relative situation of each jurisdiction with respect to others in the same region or in other latitudes with some common denominator (e.g., income level according to conventional criteria such as those of the World Bank, etc.).

2 The International Survey on Tax Administration ISORA is a standardized tax administration information collection tool, which is part of a project conducted by five organizations: the International Monetary Fund (IMF), the Intra-European Organization of Tax Administrations (IOTA), the Organization for Economic Cooperation and Development (OECD), the Inter-American Center of Tax Administrations (CIAT) and, since 2018, the Asian Development Bank (ADB). Detailed information regarding the project can be found at the following link: <https://data.rafit.org/>

3 Of this total number, a total of 119 jurisdictions have participated in each of the last four editions.

4 In most countries, the fiscal year coincides with the calendar year. But in some countries, the fiscal year does not end on the same date as the calendar year. In such cases, for example, the fiscal year 2021 is the one that ends within the calendar year 2021 (between January and November).

The methodology used for the construction of the INDITEC index is described below, which follows the one originally presented (Díaz de Sarralde and Morán, 2021) although it adds some modifications and improvements derived from a greater availability of information for several consecutive fiscal years in most of the cases surveyed. Firstly, a series of aspects related to the determination of the dimensions of analysis and the selection of the most representative variables are defined. This is followed by a brief explanation of the statistical treatment of the different components of each index -to ensure their adequate weighting-, the criteria for selecting the figures available for different years, and the strategy for aggregating all the elements in a global synthetic index, proposing two alternative formulations in order to check the statistical consistency of INDITEC's results.

1.1. Dimensions of analysis and ISORA variables considered

Firstly, as the information collected through ISORA⁵ is quite diverse, it is necessary to define a set of dimensions of analysis, which should be related to the objectives that motivate the construction of synthetic indicators -contributing to reflect central aspects of the functioning of the participating TAs-. In turn, the established dimensions should help to group and order the individual variables, both qualitative and quantitative, which will be selected for the same purpose.

Therefore, it is important to specify that the main objective of the construction and calculation of the INDITEC index is to obtain **a synthetic indicator that shows the degree of development/progress of each TA as regards the adoption of innovative tools for tax management and those ones aimed at improving tax compliance, the digitalization of its main operational processes and the efficient use of its resources (financial and human) with a focus on technological modernization.**

5 By virtue of the joint work accumulated during most of the last decade, the ISORA survey questionnaires have been gradually simplified in the most recent versions, reducing their size, and improving the clarity and precision of their questions, with the aim of increasing the response rates and improving the robustness of the results obtained. Currently, the project involves conducting an annual survey, focused on operational and technological aspects (on which this study is based), combined with a periodic survey that includes questions of a more institutional nature that are asked every four years.

In relation to this premise, the four dimensions that are considered within the INDITEC index are defined, in addition to the individual variables that are combined in each of the first ones, as follows:

TECHNOLOGICAL INNOVATION: There is currently a wide range of innovative techniques and tools that can be applied to tax management, including taxpayer interaction and support services as well as statistical processing of tax information received by TAs. In general, all of them are linked to IT systems that have the potential to provide improvements in economic and operational terms. In order to capture progress in terms of their incorporation and use, this dimension includes as variables (qualitative) the responses of the countries on the use (effective or in the implementation phase) of the following instruments:

1. *Data science and analytical tools* (which can be oriented to TA diagnosis and decision making).
2. *Cloud computing* (as an online service model with computing resources).
3. *Artificial intelligence* (including machine learning and oriented to a wide variety of cognitive tasks, e.g., sensing, prediction, pattern recognition, etc.).
4. *Distributed ledger technology (DLT) or Blockchain* (enabling efficient handling of large volumes of information combinable with security encryption).
5. *Application Programming Interfaces (APIs)* (to speed up secure information processing and enhance seamless interaction with taxpayers)⁶.
6. *Digital identification technologies* (applied, for example, to taxpayer data registration and validation processes).
7. *Virtual assistants* (software solutions that simulate interactions by answering questions or requests that would otherwise be handled by human beings, e.g. online chatbots).
8. *Whole-of-government identification systems* (to streamline all types of procedures and improve the handling of information provided by taxpayers).
9. *Robotic process automation* (used to automate repetitive tasks and generate time and workload savings for tax administration staff).

⁶ An API is a set of software functions and procedures (interface) that allows applications to access the features and/or data of another software solution. It has the advantage of protecting the complexity and sensitive information within the latter since communication with other applications is done exclusively through the secure environment of the API.

COMPLIANCE IMPROVEMENT: Another valuable dimension of tax administration is linked to the adoption of advanced tools to improve levels of voluntary tax compliance and reduce levels of tax evasion (a phenomenon that affects lower-income countries more intensely, for different reasons). In all cases, these are diverse instruments that allow TAs to better manage tax risks, better understand the critical segments of taxpayers, have greater control and auditing capacity, and simplify voluntary compliance in general. Indeed, based on the responses of the TAs themselves in ISORA 2022, the qualitative variables considered are as follows:

1. *Cooperative compliance approaches for large taxpayers* (justified by the relevance of this taxpayer segment in tax revenues for most of the countries)⁷
2. *Cooperative approach for high net worth individuals* (individual taxpayers with this characteristics represent a risk for TAs as they have the means to implement aggressive⁸ tax planning schemes).
3. *Behavioral insight methodologies or techniques* (which contributes to the better understanding of taxpayers' motivations and decisions regarding tax compliance and their relationship with TA).
4. *Adoption of mandatory electronic invoicing* (generally implemented in phases, either for a set or for all taxpayers in a jurisdiction)⁹.
5. *Mandatory use of electronic fiscal devices* (for the automatic recording of transactions, either for a group or for all active taxpayers).
6. *Use of pre-filled tax returns by the TA* (with tax information or of a third party; either partially or completely filling; either with deemed acceptance or confirmation required from taxpayers)¹⁰.

7 Cooperative compliance mechanisms are characterized by being conditional on the taxpayer demonstrating: a) sound management of tax issues, and b) willingness to operate in an open and transparent manner, and full disclosure of its tax risks as they occur. In return, the TA commits to provide improved service to the taxpayer through: a) dedicated points of contact; b) expedited resolution of technical and administrative issues; c) assignment of a reduced risk rating for audit purposes; and d) reduced penalties. As for the definition of “large taxpayers”, countries tend to do so based on variables such as the amount of annual sales or turnover, the annual net income, the value of assets, the level of imports and/or exports, the amount of taxes paid and the type of economic activity.

8 Of growing importance as a segmentation strategy for taxpayers, this is the only new variable with respect to the original version of the INDITEC index, resulting in a total of 30 variables organized in four different dimensions.

9 For more detail, both on the technical aspects and examples of effective implementation of this tool, please refer to the CIAT-BID (2018) book on electronic invoicing.

10 For more information about this tool and its potential in CIAT countries, please refer to a recent CIAT-GIZ (2019) working paper on the matter.

OPERATIONAL DIGITALIZATION: A synthetic index that seeks to show the degree of modernization of the different TAs, in the current context, requires the identification of some characteristics and modalities of their own operational functioning. To this end, several of the indicators that emerge from ISORA serve to illustrate the growing digital transformation of TAs in their internal processes (registration, tax returns processing, payment of tax liabilities, taxpayer services), especially in those where the availability of digital or electronic means is considered a substantial relative advantage over more traditional practices. In this dimension, the following variables (mostly quantitative) are considered:

1. *Electronic payment ratio* (proportion of payments received through electronic channels with respect to total payments recorded, considering the monetary value of such payments -equivalent to the effective tax collection of the TA-).
2. *Electronic filing ratio in CIT* (proportion of tax returns received through electronic channels -regardless of whether or not they are filled out, totally or partially, by the TA- in Corporate Income Tax).
3. *Electronic filing ratio in PIT* (idem above, but calculated for Personal Income Tax).
4. *Electronic filing ratio in VAT* (idem above, but calculated for Value Added Tax).
5. *Digital contact channels for taxpayer services* (proportion -effective use- with respect to the total number of incoming contacts; considers the alternatives “online”, “digital assistant” and “e-mail” which are assumed to be more flexible and agile as they do not require the physical presence of the taxpayer).
6. *Digital channels for tax registration* (availability -not necessarily effective use- of “online”, “telephone” and “e-mail” registration channels, which do not require taxpayer presence or intermediaries in the process; this is the only qualitative variable in this dimension).

RESOURCES AND BUDGET: A final dimension to be considered is linked to the availability and effective use of human and economic resources available for TAs. In this sense, the professionalization of the staff and the allocation of part of the operating budget to the development and implementation of ICTs in different areas of tax management are highly valued, as well as the possibility of having a total budget in line with the tasks performed, measured in comparable terms. Similarly, an attempt is made to weigh the relative workload to be managed by the staff of each TA, as well as the magnitude of operating expenses in relation to the tax revenues collected. Specifically, the following quantitative variables are included:

1. *Academic Qualification with Undergraduate Level* (proportion of FTE¹¹ employees holding the equivalent of a Bachelor degree in relation to the total TA staff, considering the figures at the end of each fiscal year of reference).
2. *Academic Qualification with Graduate Level* (proportion of FTE employees holding the equivalent of a Master degree -in addition to the Bachelor degree- in relation to the total TA staff as the previous variable, which provides an indication of the relative degree of professionalization).
3. *Total inhabitants per FTE employee* (considered with a negative connotation as it reflects, in an indirect way, the labor burden faced by the TAs, beyond the probable differences in labor productivity in the different countries).
4. *Active PIT taxpayers per FTE employee* (idem above, with negative connotation, specifically focused on a widespread and relatively labor-intensive tax such as the Personal Income Tax).
5. *ICT Operating Expenditures, as a percentage of GDP* (as a comparable measure of specific TA spending in the Information and Communications Technologies segment accumulated at the end of each fiscal year).
6. *ICT Operating Expenditures, as a percentage of the Operating Budget* (as a measure of the relative importance assigned to ICT technologies as a percentage of total operating expenditures).

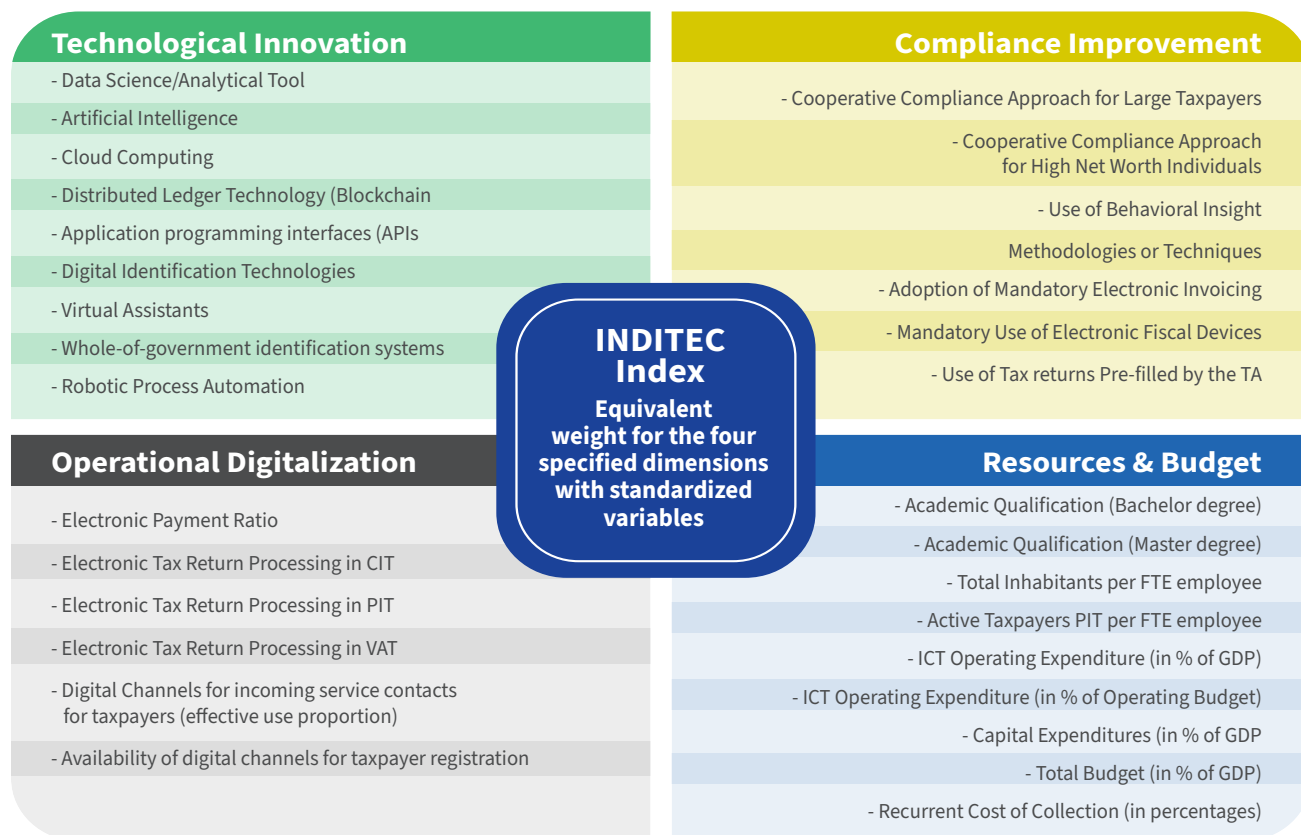
¹¹ In all cases and for comparability, it refers to Full Time Equivalents (FTE). An FTE of 1.0 means that the resources are equivalent to one full-time staff member working for a full year (all figures refer to the total balance at the end of the fiscal period under analysis).

7. *Capital Expenditures, as a percentage of GDP* (as a comparable measure of total investment expenditure of the TAs, which is mainly for the acquisition and improvement of infrastructure and material and technical resources).
8. *Total Budget, as a percentage of GDP* (although it can be very diverse and may be related to the income level of the countries and the degree of institutional development of the TAs, it provides a quick picture of their total financial resources endowment).
9. *Recurrent cost of collection, in percentages* (as a partial indicator of the (in)efficiency of each TA in the use of available financial resources; serves to identify gaps between countries in the ratio linking total operating expenditures and total net revenues¹² for a specific fiscal year for each of the TAs).

In short, the ISORA Survey has a large number of individual qualitative and quantitative indicators and variables, which will be concentrated in the four dimensions detailed above, which represent different areas of TA diagnosis and, in turn, will be summarized in partial synthetic indicators (Technological Innovation, Compliance Improvement, Operational Digitalization, Resources and Budget). Finally, as explained in the next section, these four indexes will be integrated into a global index using proportional weights. Diagram 1 shows a summary of the components used in the creation and calculation of the INDITEC Index for the benchmarking of the participating TAs of ISORA 2022.

¹² In previous versions of ISORA, in order to ensure the comparability of the figures with previous editions of the survey, the standard criterion for calculating the cost of collection consisted of dividing the amount of total operating expenses by the sum of total net revenues (of refunds), first subtracting from the denominator the collection of gross VAT on imports in those cases where the tax was in force. As a result of this methodological change, it is likely that the updated figures and the ordering of the countries in relation to this variable have been modified with respect to what emerged from the previous editions.

Diagram 1: Dimensions and variables included in the design of INDITEC Index



Source: Authors' elaboration based on ISORA 2022 Survey.

1.2. Normalization and selection of data and variable aggregation method

Firstly, given the diversity of variables considered for the construction of INDITEC, in addition to the fact that the values recorded may present certain biases and gaps between countries that could distort the overall results, it is necessary to carry out some transformations and adaptations in each of the dimensions specified in order to obtain homogeneous quantitative variables.

Thus, for example, with regard to the incorporation of the various **technological innovation** tools, country responses are evaluated for each of the cutting-edge technologies considered, with values assigned according to the following scale:

- **1.0:** for cases where the technology in question was already implemented and effectively used at the end of each reference fiscal year or at the time of answering the survey when referring to the last year available (2021).
- **0.5:** for those TAs that have declared that they are in the implementation phase for future use at the time of answering the survey.
- **0.0:** for cases in which the technology analyzed was not in use, including cases where implementation had not yet begun at the end of each fiscal period.

Regarding the techniques aimed at **improving tax compliance**, the transformation of the responses (Yes/No) is carried out by directly considering binary variables, where affirmative answers receive a value of 1.0 and negative answers a null value (0.0).

For the variables related to the **operational digitalization** of certain basic processes of TAs operation, it is necessary to adapt the available figures, which mostly correspond to percentages relative to the total of each variable. The method chosen, applicable to most of the variables included (electronic payment ratios, electronic filing of returns ratios and even the number of incoming contacts received by the TA through electronic means), consists of expressing all the figures in proportions on a continuum between 0 and 1, all with a positive evaluation as long as they are close to unity (the maximum feasible).

The exception is constituted by the qualitative variable referring to the availability of digital channels for the registration of taxpayers, for which values are assigned according to the following scale:

- **1.0:** for TAs that have “on-line” channels for such procedure.

- **0.5:** for cases where, although the digital registration channel mentioned above is not available, an intermediate alternative such as “telephone” or “e-mail” is offered”.
- **0.0:** for the rest of the TAs that do not yet have any of the above three channels and are limited to “mail”, “face-to-face” or “other” (at least until the close of each fiscal year).

Finally, the efficient use of **resources and budget** can be reflected in a series of quantitative variables which can be expressed as proportions of a total reference value (e.g., total staff or total operating budget) or as very different numbers of inhabitants or contributors per TA employee. Therefore, given the different nature of the variables considered and in order to avoid unnecessary biases in one direction or the other (where the “feasible” maximum values may be very different depending on the indicator considered), all variables selected for this dimension of analysis are normalized using the following equation:

$$Y_{x,it} = \frac{x_{it} - \min(x_{it})}{\max(x_{it}) - \min(x_{it})}$$

Where $Y_{x,it}$ is the normalized variable of x , of country i , in year t ; $\min(x_{it})$ is the minimum value of the variable x_{it} for the universe of 174 countries with any response recorded in ISORA 2022; while $\max(x_{it})$ is the highest value of x_{it} within the same sample. It should be noted that the equation presented above is applied for all those variables that make up this dimension (resources and budget) to which a positive valuation is attributed, such as those referring to the academic training of employees, capital expenditure or the operating budget allocated to ICT¹³.

13 Although this transformation could have been applied to the variables of the dimension related to operational digitalization, the fact that all of them showed preliminary figures between 0 and 1 makes this procedure unnecessary for the purpose of having standardized and homogeneous variables. A different case is that of variables expressed according to the number of employees or as percentages of GDP, where the absence of this statistical technique could lead to an unequal allocation of the relative importance of each variable in their aggregation, first in the partial indexes by dimension and, finally, in the overall calculation of the INDITEC index.

However, the same dimension also contains variables that have a negative connotation in terms of the efficient use or availability of resources -that is, where low values for such variables constitute a relative advantage in comparative terms-. This can be seen, for example, with respect to the number of inhabitants per employee and the number of Personal Income Taxpayers (PIT) per employee, where relatively high figures are associated with heavy labor burdens for the respective workforces, regardless of possible differences in labor productivity between countries. Similarly, the cost-of-collection coefficient is considered to be an approximate measure of (in)efficiency in the overall use of available resources, where relatively lower figures are positively valued. For these cases, the normalization of the data obtained in ISORA 2022 is carried out by applying the following inverse formula (keeping the references detailed above):

$$Y_{x,it} = 1 - \frac{x_{it} - \min(x_{it})}{\max(x_{it}) - \min(x_{it})}$$

A second step in the methodology developed is related to the criteria for selecting and adjusting the available data to ensure comparability. It should be clarified that, in all cases, information derived directly from the responses of the TAs themselves to the questionnaires that made up the edition of ISORA 2022 is used. Nevertheless, prior to any calculation, a comprehensive review of the figures and data available has been carried out to detect any incongruence or inconsistency that might arise from the processing of the survey. In general, the few outlier cases by virtue of the responses recorded (transformed into quantitative variables) are related to differences in the monetary units of measurement between the numerator and the corresponding denominator, for example the country's Gross Domestic Product (taken from the World Bank's online database) or the Total Operating Budget of their respective TA (according to ISORA). In cases where it was feasible, the figures were corrected to make them consistent with those of the rest of the countries; in cases where such adjustment was not possible, the data (null) was directly eliminated to avoid affecting the averages calculated on the variables of interest for this study¹⁴.

¹⁴ As for data with errors or omissions, which are not significant in number for any of the selected variables, it has been found that most of them are concentrated in countries that do not belong to CIAT or the OECD. Only two very specific cases were detected (Bolivia and Panama) where there was an inconsistency in the data on TA expenditures (total operating expenses were lower than salary expenses, when the latter should be included in the former). In these cases, an adjustment is made by adding both items to obtain the total operating cost. In addition, for the calculation of total expenses, according to the methodology derived from the survey, the amount would be obtained by adding operating expenses and capital expenses. In the case of Bolivia, in fact, the related values were recalculated according to this definition.

This edition of ISORA, unlike previous editions, has systematized information covering the period 2018-2021, thus allowing for comparative analyses with a time perspective. Precisely, in this document the interest is focused on evaluating and, to some extent, quantifying the main changes that could have occurred between two reference years (2019 and 2021) separated by an extraordinary event such as the COVID-19 pandemic. However, an informative obstacle is presented by the lack of response from some TAs on certain variables, particularly those of a quantitative nature corresponding to the dimensions of operational digitalization and management of resources and budget.

Therefore, in order to have equivalent and homogeneous mean values, it is necessary to correct some omissions in the ISORA database itself and to calibrate the individual responses for each of the 174 jurisdictions for all the variables considered and for the two-time reference points specified for this work. To this end, a series of basic criteria are adopted that seek to homogenize the vast amount of information available, as follows:

- In the cases for which information is available for the four years covered (2018, 2019, 2020 and 2021), the data selected correspond, as explained, to the fiscal years 2019 and 2021. However, should any of them not exist in the ISORA database, the data corresponding to the previous year is used in each case (2018 instead of 2019 and 2020 as a substitute for 2021, assuming a probable continuity in the observable trends).
- This is applicable both for qualitative variables which, after the above mentioned transformations, acquire values of 0 and 1 -for those of binary type- or 0, 0.5 and 1 -for those with three response options-, as well as for quantitative variables that were normalized according to the formulas detailed above.
- For those cases where, for a given variable, there is no data available for any of the four years surveyed in ISORA 2022, a null value (0) is assigned in the corresponding jurisdiction in both reference years (2019 and 2021) as a sign of non-response and non-existence of information. This is the same criterion that had been followed in the first version of INDITEC, in order to avoid artificial biases in the calculation of global averages and by groups of countries, making it feasible to compare samples or universes of cases of equal size in two different time reference points.

- In any case, the averages calculated should be considered as “minimum values”, estimated from the data available in the latest edition of ISORA 2022 referring to fiscal years 2019 and 2021 (or 2018 and 2020, respectively, in the missing cases). To bear this in mind when analyzing the INDITEC results -as well as the indices by dimensions- the response percentages for each country and the averages by groups of countries for the 30 variables considered¹⁵ are also calculated.
- In those cases of jurisdictions where data exists only for some or some of the years covered by ISORA 2022 (but not all or none), the possibility of having information for one of the two reference years allows “replicating” it in the other fiscal year for which data is not available for the variable under analysis (from 2019 to 2021 or vice versa). This would mean assuming that there would have been no changes from 2019 to 2021 for those particular cases, giving a certain idea of constancy and avoiding artificial biases in the calculated averages.
- Although the analysis of the results will finally concentrate on the figures for the most recent year, it is recognized that this last criterion could present limitations. However, the picture obtained will be more realistic than the one that would emerge from comparing specific figures against non-existent ones to which a zero value is assigned. Of course, this will result in an increase in regional and global averages, but it should not affect the trends and stylized facts that can be identified from the analysis of the results.

Finally, a concluding indispensable task is to determine the methodology for aggregating, firstly, the variables available in each dimension analyzed and, secondly, the partial indicators by dimension into a single synthetic index, which will allow comparisons to be made between different periods and different groups of countries or individual cases that participated in the ISORA 2022 Survey.

¹⁵ It should be highlighted that for quantitative variables, and by virtue of this methodological criterion, the value 0 has been transformed into the minimum value to be considered at the time of calculating the normalization formula detailed in this section.

After defining the values assigned to each variable according to the criteria detailed above, total indexes are calculated by dimension, first in absolute terms from the sum of the individual figures for each variable. It should be noted that, given that the number of variables is different per dimension, before integrating them into a synthetic index (INDITEC), the values assigned to the different countries for each of the individual variables or indicators considered are weighted by the number of variables in each dimension in order to ensure an equivalent contribution (in absolute terms) of each dimension analyzed¹⁶.

Next, the indexes by dimension are calculated in relative terms by applying, once again, the normalization equation expressed in previous paragraphs (with a positive connotation, i.e. higher values represent better relative performance). In this way, the synthetic indexes by dimension are weighted according to the maximum values calculated for each of them, which are achieved by at least one of the countries or jurisdictions participating in ISORA.

For the calculation of the INDITEC index - in a process of aggregation of the four dimensions mentioned above - equivalent weightings are applied where each partial index (per dimension) contributes a quarter of the total, as expressed in the following equation for each country “*i*” (174) in each period “*t*” (2019 and 2021):

$$INDITEC_{it} = 1/4 \times Innovation_{it} + 1/4 \times Compliance_{it} + 1/4 \times Digitalization_{it} + 1/4 \times Resources_{it}$$

The average values of each synthetic index (by dimension and in total) are also determined for different groupings of countries, for example, according to geographic region, income level, CIAT membership and OECD membership.

¹⁶ The “Compliance Improvement” and “Operational Digitalization” dimensions consist of 6 variables, while “Technological Innovation” and “Resources and Budget” are made up of 9 variables. For this reason, the partial index calculated by simple addition of the figures for the latter two dimensions must be weighted by the number of variables of the former, i.e. it is divided by 9 and then multiplied by 6 to ensure an equivalent contribution from each dimension.

In addition, a second synthetic index of a similar nature, INDITEC 2, is calculated, with the only difference of considering only the first three dimensions mentioned above (with equivalent weightings of one third of the total) without including the variables referring to the availability and use of human and financial resources. This new indicator would place more emphasis on the innovative tools and instruments that reflect the digital and technological transformation processes that the different TAs have been undergoing in recent years and that they will undoubtedly have to reinforce and consolidate in the coming years. In mathematical notation, the INDITEC 2 index - whose results should serve to provide robustness and statistical consistency to the original global synthetic index - is calculated as follows:

$$INDITEC\ 2_{it} = \frac{1}{3} \times Innovation_{it} + \frac{1}{3} \times Compliance_{it} + \frac{1}{3} \times Digitalization_{it}$$

Finally, in order to comparatively evaluate the countries -with special emphasis on CIAT members-, quartiles will be calculated for INDITEC and the relative position of each particular case is determined in a ranking for the 174 TAs participating in ISORA 2022. The distribution by quartiles is also previously analyzed by groups of countries to try to identify trends and general patterns according to their classification characteristics such as geographic location or income level expressed in comparable terms.

In this way, and with all the necessary precautions at the time of drawing conclusions, the aim is to have an overview of the relative degree of modernization, technological innovation, and digital transformation of TAs worldwide, highlighting the potential usefulness of this type of synthetic indicators in terms of diagnosis and benchmarking of these agencies.

2 INDITEC Index results for the most recent period

Based on the methodology proposed, the results of the INDITEC index for the most recent period will be presented below. Special emphasis will be placed on comparing the current status of the countries participating in ISORA 2022 between two different reference years (2019 and 2021), seeking to identify the main changes in the digital transformation of TAs during the period most affected by the COVID-19 pandemic.

The general hypothesis of this paper is that the pandemic may have accelerated changes that were already evident in different countries. In other words, given the restrictions derived from the pandemic and the need to promote a rapid recovery of tax collection, the opportunity could have been used to make strong progress in various dimensions of the digital transformation of TAs, especially in those that facilitate compliance and interaction with taxpayers but that, at the same time, can improve the internal processes of the agencies, including control and auditing segmented by critical tax risk sectors.

In this regard, this second section calculates a set of synthetic indexes for the four dimensions specified in the methodology as well as the global INDITEC index, presenting the results at the average level for various group of countries. An alternative formulation of the global index (INDITEC 2) is also proposed and INDITEC quartiles are calculated for the entire universe of countries considered.

On the other hand, the individual analysis focuses on the CIAT member countries with the most recent information available and contrasting the identifiable changes between the situation before and after the pandemic. The aim here is to construct a ranking of these countries that will serve to provide the relative location of each one of them in relation to INDITEC (in its two formulations) and in correspondence with the quartiles determined and the four partial dimensions of analysis.

2.1. Figures for country clusters (by dimensions and at the global level)

The systematization of the data collected through ISORA 2022 allows the grouping of figures corresponding to different countries or jurisdictions according to conventional criteria related to the geographic location, the income level in comparable terms (Gross National Income per capita in dollars, according to the World Bank), or the membership to an international organization such as CIAT or the OECD. This makes it possible to calculate benchmark values for the comparative evaluation of the participating jurisdictions. In this sense, the average values of the indexes can be interpreted as the general degree of progress in the different dimensions of analysis or, alternatively, as an image of the existing margin for progress with improvements in the particular variables that make up each partial or global index (INDITEC).

Firstly, the averages calculated for the entire universe of ISORA 2022 (table 1) allow us to verify a series of stylized facts in the four main dimensions analyzed:

- The synthetic index referring to the technological innovation dimension is the one that shows the lowest values, which would suggest ample room for improvement in the future. Nevertheless, the progress achieved in recent years is recognizable, and it is reflected in an increase for the partial index from 0.33 in 2019 to 0.38 in 2021.
- The overall performance is somewhat better in terms of the implementation of modern tools aimed at combating tax noncompliance, an area in which there was also an improvement between the same periods of reference (from 0.36 to 0.43).
- The average figures are relatively higher for the index linked to the digital transformation of internal TA operations, with an advance from 0.51 to 0.54 between 2019 and 2021.
- Strikingly, the dimension where the highest figures are recorded (Resources and Budget) is the only one in which a slight drop is observed in 2021 with respect to 2019 (from 0.63 to 0.62). While there may be several reasons for this particular result, the impact of the strong recovery of economic activity levels (GDP) in 2021 is recognized, increasing the denominator of some of the selected variables for this dimension and reducing their relative weight on the calculated partial indexes.

Table 1: INDITEC partial indexes by dimensions of analysis
Simple averages for selected groups of countries, years 2019 and 2021

Code	Country Groups	Technological Innovation		Compliance Improvement		Operational Digitalization		Resources and Budget	
		2019	2021	2019	2021	2019	2021	2019	2021
ISORA	ISORA	0.33	0.38	0.36	0.43	0.51	0.54	0.63	0.62
EAP	East Asia and Pacific	0.33	0.35	0.32	0.33	0.36	0.40	0.60	0.60
ECA	Europe and Central Asia	0.47	0.57	0.51	0.57	0.72	0.76	0.68	0.66
LAC	Latin America and the Caribbean	0.28	0.34	0.30	0.39	0.54	0.58	0.68	0.66
MENA	Middle East and North Africa	0.20	0.31	0.12	0.31	0.53	0.54	0.48	0.47
NAM	North America	0.69	0.67	0.33	0.33	0.70	0.72	0.63	0.59
SAS	South Asia	0.13	0.27	0.25	0.33	0.49	0.52	0.55	0.58
SSA	Sub-Saharan Africa	0.24	0.24	0.30	0.43	0.33	0.36	0.59	0.60
Low Income	Low Income	0.23	0.24	0.29	0.39	0.25	0.27	0.58	0.57
Lower-Middle	Lower-Middle Income	0.25	0.29	0.36	0.41	0.42	0.45	0.61	0.63
Upper-Middle	Upper-Middle Income	0.27	0.36	0.31	0.44	0.52	0.57	0.64	0.63
High Income	High Income	0.48	0.54	0.43	0.46	0.67	0.69	0.66	0.63
CIAT	CIAT members	0.42	0.49	0.42	0.51	0.69	0.72	0.66	0.65
Non-CIAT	CIAT non-members	0.30	0.35	0.34	0.41	0.46	0.49	0.62	0.61
OECD	OECD members	0.61	0.68	0.54	0.58	0.77	0.81	0.69	0.66
Non-OECD	OECD non-members	0.25	0.30	0.30	0.39	0.43	0.47	0.61	0.61

Source: Authors' elaboration based on ISORA 2022 Survey.

Note: In the cells of the table, green color indicates a positive variation between 2019 and 2021 for each indicator, yellow color indicates cases with no variation, and red color highlights cases where there was a decrease between those years.

The analysis by different country groupings shows some interesting results, which reveal some general trends in each of the dimensions evaluated. On the one hand, when disaggregated by geographic region for the most recent fiscal period (2021), the averages calculated provide evidence about the existing large gaps in terms of the use/implementation of innovative instruments for tax management (including those aimed at compliance improvement) and also of the progress in terms of operational digitalization (Table 1 and Figure 1).

The region with the best relative performance is Europe and Central Asia, which exhibits figures that are higher than those of other regions in the four dimensions analyzed. The only exception is seen in the area of “technological innovation” where the maximum average value (0.67) is reached by North America¹⁷, with the singularity of being the only region to experience a (slight) decline in this partial indicator between 2019 and 2021. On the other hand, this region remains relatively low in the “compliance improvement” dimension, where the rest of the regions show significant progress and considerable room for further progress¹⁸.

A salient result, in line with what is indicated at the global level, is given by the setback in the area referred to the availability and management of resources and the budget, where in 2019 the highest average values were already recorded in most of the regions. Among them, Latin America and the Caribbean stands out (0.66 in 2021) at the same level of regions composed of more developed countries, with the exceptions of South Asia and Sub-Saharan Africa that continued to improve their figures in these indicators after the COVID-19 pandemic (table 1). This contrasts with what is observed for the “operational digitalization” dimension, where progress between 2019 and 2021 is unanimous for all regions (considering simple averages), which may have been driven by the urgencies and needs posed by this unfortunate event, activating, or accelerating digital transformation processes in TAs around the world to provide rapid responses to the new context through new “online modalities”.

17 According to the criteria adopted by the ISORA project, this regional grouping included Bermuda, Canada and the United States. To avoid artificial bias, the first of these countries was relocated within the “Latin America and the Caribbean” region, while, for the purposes of this study, the second two countries make up the “North America” region.

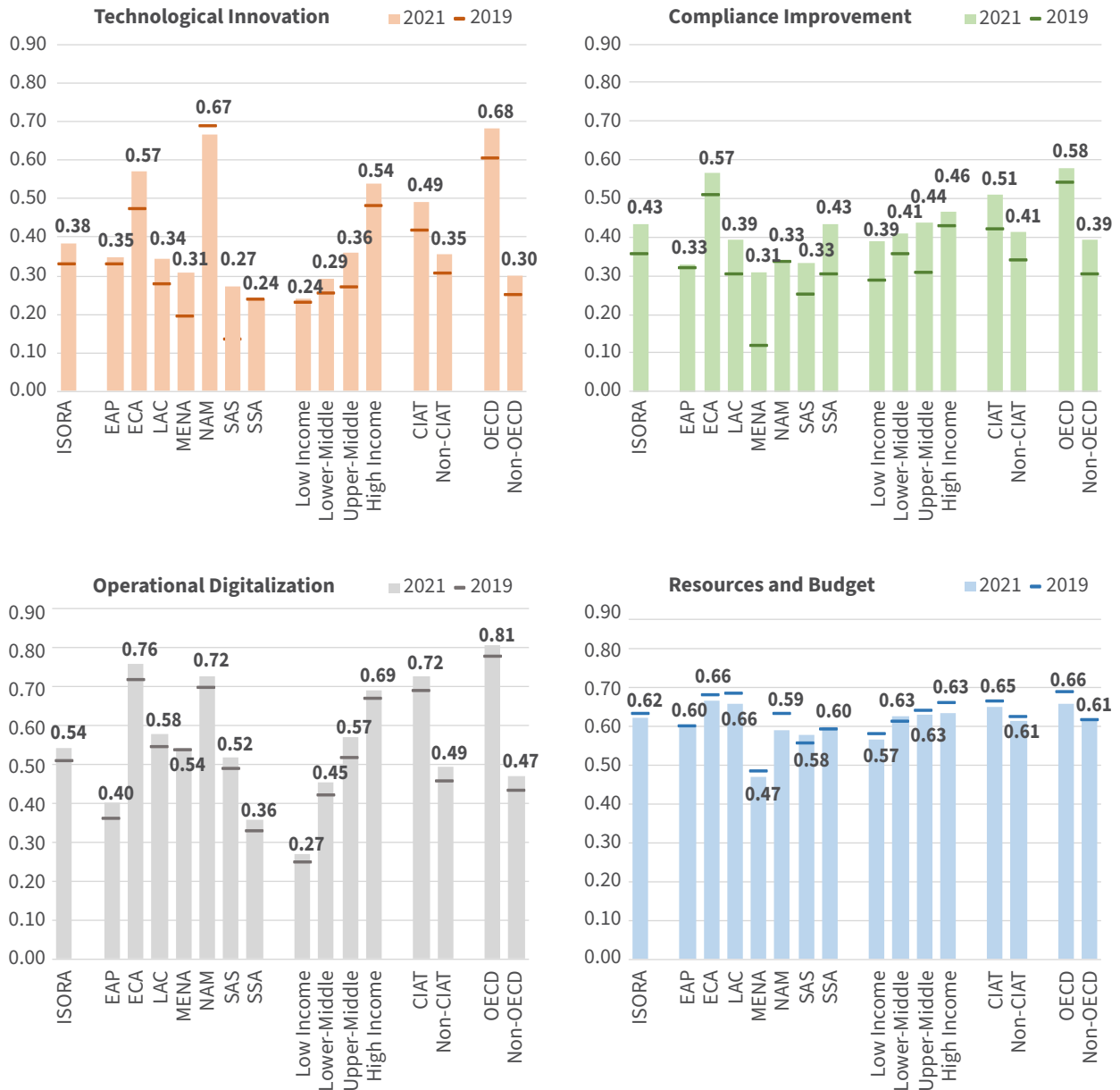
18 One of the factors that makes it necessary to relativize direct comparisons -and that keeps them only as “trend-oriented”- is related to the very unequal number of ISORA participating countries included in each of the identified geographic regions (see Table 2 in this regard).

When grouping countries with available information according to their respective¹⁹ income levels (according to the World Bank’s classification criteria), a clear positive relationship can be identified, wherein group averages for various indicators increase with the income level and reach their peak in the High-Income group of countries. Additionally, the gaps between jurisdictions are more noticeable, particularly concerning the dimensions of technological innovation and operational digitalization (Table 1 and Figure 1). For the former, the score achieved by the highest-income group in 2021 (0.54) more than doubles that attained by the Low-Income group (0.24); for the latter, the difference between the extremes based on income is even more substantial (ranging from 0.27 to 0.69).

Regarding the incorporation of techniques aimed at improving compliance, the positive association based on income persists, although the resulting figures are closer to the global average and vary within different groups, ranging from 0.39 to 0.46. It is worth noting that, in the three aforementioned dimensions, all the calculated averages according to the income level show a concrete improvement in 2021 compared to the figures from 2019. Lastly, contrary to the indicated trends, the “resources and budget” dimension shows slight declines between 2019 and 2021 for three out of the four identified subgroups, except for the average of Low-Middle-Income countries, which achieved a similarly slight advancement in this area.

19 Of the total number of jurisdictions (174), the 32% of them (56) corresponds to “High Income” countries, with a majority participation from the regions of Europe and Central Asia, North America and some from Latin America and the Caribbean. The bulk of the countries (56%) are in intermediate income groups: “Upper-Middle Income” with 30% of the total (52 countries) and “Lower-Middle Income” with 26% (45 countries) which, in addition to the aforementioned regions, also include Asian, African and Oceania countries. Finally, the remaining 12% (21) corresponds to jurisdictions classified as “Low Income”, mostly located in the region of Sub-Saharan Africa.

Figure 1: INDITEC partial indexes by dimensions of analysis (panels)
Simple averages for groups of countries, years 2019 and 2021



Source: Authors' elaboration based on ISORA 2022 Survey.

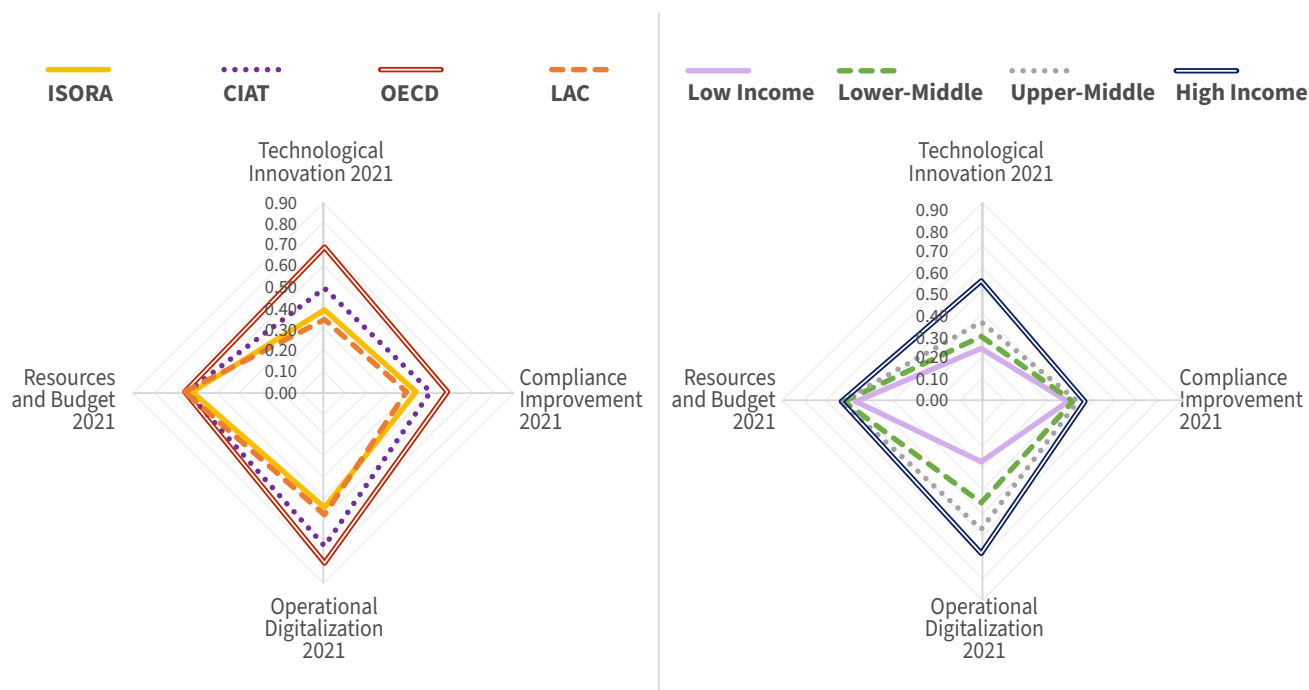
Note: The value labels presented in the four panels correspond to the most recent fiscal year (2021).

However, caution should be taken when considering the above as a regression or an unfavorable outcome in that regard, especially given its already relatively high level for the fiscal year 2019. As inferred from the developed methodology, while the formulation of indicators tends to positively assess a higher value in absolute terms, some of the variables included to analyze the “resources and budget” dimension could be affected by changes in efficiency in their use and utilization (which is not straightforward to quantify with ISORA variables). This, coupled with the likely disruptions stemming from exogenous changes in weighting monetary variables such as the GDP level of each jurisdiction, makes it imperative to relativize some changes in short-term trends, particularly in light of the profound economic impacts of the COVID-19 pandemic crisis in recent years.

Finally, in the first edition of this study the cluster of CIAT member countries had already demonstrated a better performance in all four analyzed dimensions compared to jurisdictions outside this institution (Non-CIAT). The results derived from ISORA 2022 confirm this finding, revealing an upward trend between 2019 and 2021 in terms of “technological innovation” (from 0.42 to 0.49), “compliance improvement” (from 0.42 to 0.51), and “operational digitalization” (from 0.69 to 0.72). However, this trend is not mirrored in “resources and budget,” where a modest decline is recorded (from 0.66 to 0.65 in 2021), aligning with the global behavior of this partial indicator (Figure 1). Similar trends are observable for the entire OECD country group (compared to non-members), albeit with higher levels for the partial indexes and more significant differences in all aspects. This is within expectations and may serve as global reference benchmarks for the rest of the countries participating in ISORA.

There is an alternative and concise way to visualize the existing gaps between groups of countries in each of the analyzed dimensions for the most recent fiscal period. In Figure 2, two radial charts are presented, confirming that relative performance differences are more evident and significant concerning the adoption of technological innovations and the digitalization of operational processes, especially when assessing the average values of the calculated indices based on the income level of countries (right panel). The “CIAT” cluster shows figures well above the ISORA global average, some approaching to “OECD” averages (left panel), except in the “resources and budget” dimension, where there is some parity among the averages for different country groups around the global mean (0.62).

Figure 2: INDITEC partial indexes by dimensions of analysis (radial charts)
Simple averages for groups of countries, years 2019 and 2021



Source: Authors' elaboration based on ISORA 2022 Survey.

The aggregation of indices by dimensions (with equivalent weights) allows to obtain the synthetic index INDITEC for the entire “ISORA universe”, with a global average standing at a value of 0.50 for the year 2021 (Table 2). This implies appreciable growth compared to the fiscal year 2019 preceding the pandemic (0.46). This progress is a result of the improvement of the index at the individual level in 121 out of the 174 jurisdictions surveyed, while in the remaining 53 the INDITEC showed a decrease between these temporal reference points. It is noteworthy to consider the higher response rate of countries recorded between 2019 and 2021 (87% vs. 91%) for the set of 30 variables comprising the INDITEC, thereby enhancing its statistical precision. However, due to certain statistical limitations inherent to the database itself, caution is necessary when comparatively evaluating the obtained results.

Table 2: INDITEC global index, response rate percentage, and number of cases with changes in the INDITEC
Simple averages for groups of countries, years 2019 and 2021

Code	Country Groups	INDITEC (Total)		Response Rate		INDITEC Change 2019/21 (cases)	
		2019	2021	2019	2021	(+)	(-)
ISORA	ISORA	0.46	0.50	87%	91%	121	53
EAP	East Asia and Pacific	0.40	0.42	80%	89%	21	12
ECA	Europe and Central Asia	0.59	0.64	94%	94%	37	13
LAC	Latin America and the Caribbean	0.45	0.49	92%	94%	24	10
MENA	Middle East and North Africa	0.33	0.41	71%	83%	6	1
NAM	North America	0.59	0.58	93%	93%	1	1
SAS	South Asia	0.36	0.42	80%	87%	6	2
SSA	Sub-Saharan Africa	0.37	0.41	86%	89%	26	14
Low Income	Low Income	0.33	0.37	83%	85%	14	7
Lower-Middle	Lower-Middle Income	0.41	0.45	84%	89%	26	19
Upper-Middle	Upper-Middle Income	0.43	0.50	87%	92%	45	7
High Income	High Income	0.56	0.58	92%	94%	36	20
CIAT	CIAT members	0.55	0.59	93%	94%	27	11
Non-CIAT	CIAT non-members	0.43	0.47	86%	90%	94	42
OECD	OECD members	0.65	0.68	96%	96%	26	12
Non-OECD	OECD non-members	0.40	0.44	85%	90%	95	41

Source: Authors' elaboration based on ISORA 2022 Survey.

Note: In the cells of the table, green color indicates a positive variation between 2019 and 2021 for each indicator, yellow color indicates cases with no variation, and red color highlights cases where there was a decrease between those years.

When examined by geographic region, differences become apparent among the averages of each country group: Europe and Central Asia, with an average INDITEC of 0.64, stands out as the highest, surpassing the rest. Alongside North America, which reached 0.58 in 2021 (being the only region experiencing a decrease in its indicator compared to 2019), these two regions are the only ones exceeding the global average (Table 2). Latin America and the Caribbean, with a score of 0.49, just falls short of this benchmark, while other regions lag further behind in the global INDITEC index, ranging from 0.41 to 0.42. The response rates in percentages, considering the 30 variables surveyed, are high for all regional averages, indicating a general and significant improvement in this statistical indicator (North America maintained an already high percentage of 93% between 2019 and 2021). Regarding the count of cases with changes in INDITEC between these fiscal periods,

in Europe and Central Asia, 37 out of 50 jurisdictions showed a positive increase in INDITEC, along with 24 out of 34 countries in Latin America and the Caribbean, and 26 out of 40 in Sub-Saharan Africa, among other jurisdictions participating in ISORA.

The ranking of jurisdictions according to income level confirms the positive association with the INDITEC averages, with a very significant gap in 2021 between the Low Income (0.37) and High Income (0.58) groups of countries, although there has been an improvement in all cases with respect to the figures for 2019. The response percentages, considering all the selected variables, are high in all cases, although they also show that, on average, they increase with the income level of the countries. As can be seen in Table 2, in all the groups determined according to income, the number of jurisdictions with a positive variation in INDITEC between 2019 and 2021 exceeds the number of those with some setback in this indicator, with the Upper-Middle Income group standing out from the rest with 45 cases of increase and only 7 with some decrease.

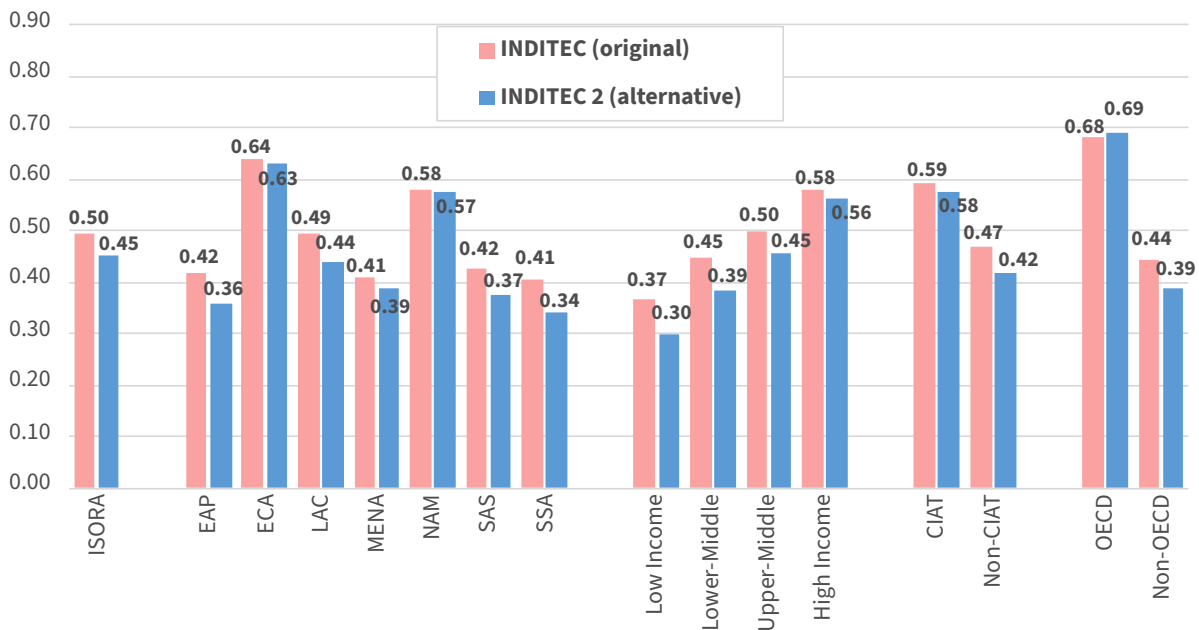
For both CIAT and OECD jurisdictions, the average INDITEC values (0.59 and 0.68, respectively) are much higher than for the group of countries that do not belong to these organizations. In both cases, the average response rate is also slightly higher and close to 100%. In turn, in each of these groups of 38 jurisdictions each, more than two thirds of the cases surveyed show increases in their respective INDITEC value between 2019 and 2021 (Table 2).

As explained in the methodology, in order to provide greater robustness and consistency to the INDITEC index estimation procedure, an alternative synthetic index (INDITEC 2) has also been calculated, covering the same dimensions and variables as the original version except for the one related to the availability and application of resources and the total budget (which, on the other hand, is where a smaller relative gap between the different jurisdictions and groups of countries is observed).

Consequently, INDITEC 2 encompasses three analytical dimensions (technological innovation, compliance improvement, and operational digitalization) with equivalent weights (1/3 each). Its magnitude is slightly lower than the original version in all cases, but it maintains the trends observed when analyzing the data by geographic region and income level (Figure 3).

The only exception to this regularity occurs in the group of countries that are members of the OECD, and this can be explained by the relatively low incidence, on average, of the “resources and budget” dimension in the jurisdictions of this organization, compared to the other three assessment areas. In some groups, particularly in the Latin America and the Caribbean region or in the Low and Middle-Low-Income group, greater differences are observed between the two indices, which would indicate the significant relative contribution of the “Resources and Budget” dimension to the overall performance of these revenue agencies.

Figure 3: INDITEC global index (original) and INDITEC 2 (alternative, without “resources and budget”) Simple averages for groups of countries, year 2021



Source: Authors’ elaboration based on ISORA 2022 Survey.

On the other hand, the construction of the INDITEC index for each of the countries participating in ISORA 2022 offers the possibility of ranking the available cases according to the resulting figures. In this way, it is possible to obtain not only an individual ranking but also to distribute the total number of countries into four quartiles according to the INDITEC²⁰ index value. In this regard, the following reference values were established for the 2021 fiscal year, within the range between the minimum (0.030 for Libya) and the maximum (0.893 for

²⁰ Since the total number of countries (174) is not an exact multiple of four, two quartiles of 44 countries (1 and 4) and two quartiles of 43 countries (2 and 3) have been determined).

Denmark) of the ISORA²¹ universe:

- 0.03-0.32 for quartile 1 (44 countries)
- 0.32-0.52 for quartile 2 (43 countries)
- 0.52-0.66 for quartile 3 (43 countries)
- 0.66-0.89 for quartile 4 (44 countries)

With the quartiles already determined, it is possible to analyze the distribution of the countries among them and cross-reference this information with the classifications already presented, such as the geographic region to which they belong or the income level they hold, in addition to observing possible changes between 2019 and 2021 (Table 3).

Indeed, there is a high concentration of jurisdictions from the East Asia and Pacific, South Asia and Sub-Saharan Africa regions in the first two quartiles. The first quartile has undergone almost no change in its relative structure of countries by geographic region between these years, with only one drop in East Asia and Pacific, which was offset by an additional entrant from South Asia. On the other hand, quartiles 2, 4 and, especially, quartile 3 show the greatest changes in their regional composition. Conversely, the countries of Europe and Central Asia and North America (United States and Canada) are mostly concentrated in the two quartiles with the highest values for the synthetic index. Latin America and the Caribbean is shown as a more heterogeneous region with several cases in each of the identified quartiles, something that would also apply to the countries of the Middle East and North Africa.

²¹ For information purposes only, for year 2019 the reference values of the quartiles turned out to be: 0.03-0.31 for quartile 1 (44 countries); 0.31-0.47 for quartile 2 (43 countries); 0.47-0.61 for quartile 3 (43 countries); 0.61-0.87 for quartile 4 (44 countries). The maximum value reached in that year corresponds to Hungary (0.87) and the minimum to Libya (0.03).

Table 3: Distribution of countries by INDITEC quartiles and global index
Number of countries for selected country groups, years 2019 and 2021

Country Groups	INDITEC Quartile 1		INDITEC Quartile 2		INDITEC Quartile 3		INDITEC Quartile 4		INDITEC TOTAL	
	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021
ISORA	44	44	43	43	43	43	44	44	174	174
East Asia and Pacific	12	11	8	10	9	7	4	5	33	33
Europe and Central Asia	2	2	6	6	17	17	25	25	50	50
Latin America and the Caribbean	10	10	8	7	6	7	10	10	34	34
Middle East and North Africa	3	3	1	1	3	2	0	1	7	7
North America	0	0	0	0	1	2	1	0	2	2
South Asia	2	3	5	3	0	2	1	0	8	8
Sub-Saharan Africa	15	15	15	16	7	6	3	3	40	40
Low Income	9	10	7	9	3	1	2	1	21	21
Lower-Middle Income	10	13	20	16	11	11	4	5	45	45
Upper-Middle Income	17	15	9	8	13	13	13	16	52	52
High Income	8	6	7	10	16	18	25	22	56	56
CIAT members	4	4	8	6	8	13	18	15	38	38
CIAT non-members	40	40	35	37	35	30	26	29	136	136
OECD members	0	0	2	2	11	13	25	23	38	38
OECD non-members	44	44	41	41	32	30	19	21	136	136

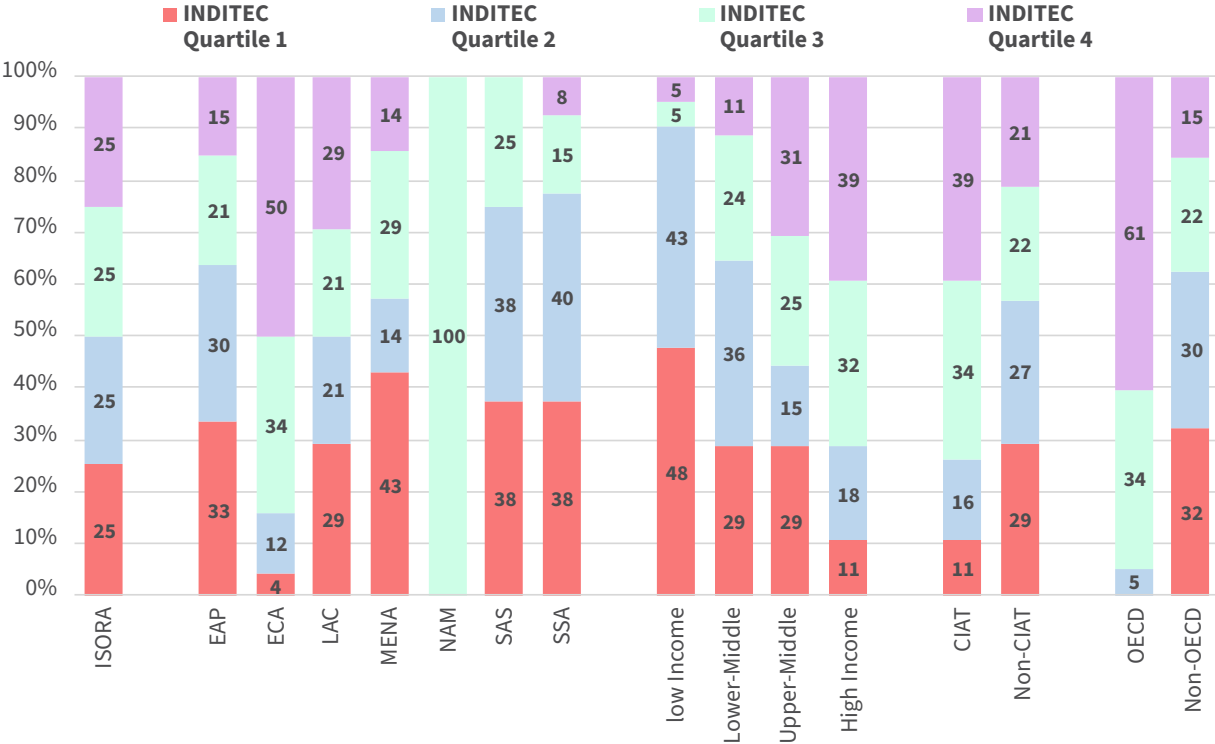
Source: Authors' elaboration based on ISORA 2022 Survey.

Note: In the cells of the table, green color indicates a positive variation between 2019 and 2021 for each indicator, yellow color indicates cases with no variation, and red color highlights cases where there was a decrease between those years.

The unequal distribution of countries according to INDITEC index quartiles can also be observed in relative terms for the last available year (Figure 4). For instance, an analysis based on income levels reveals a positive correlation with the mean values of INDITEC. The group of Low-Income jurisdictions exhibits a significant concentration of cases in the lower quartiles, a situation that gradually reverses as higher income groups are considered, especially in the High-Income group where, in 2021, 22 out of the 56 countries considered (39% of the total) are situated in quartile 4 of INDITEC. It is noteworthy that this concentration was even higher in 2019 when that proportion reached 25 cases, as evident in Table 3. Changes are also notable in the Upper-Middle-Income group, where, between the two reference periods before and after the pandemic, the proportion of countries in quartiles 1 and 2 (44% of the total together) decreased, while their concentration in the highest quartile increased.

Lastly, among the member countries of CIAT, in 2021, over 70% (28 out of 38) are situated in quartiles 3 and 4 (compared to 26 in 2019). In contrast, only 4 (11%) of the members are in the lowest quartile of the INDITEC ranking, maintaining this proportion between 2019 and 2021 (Table 3). These disparities are accentuated in the case of OECD member countries, where nearly 95% of them fall within the top two quartiles, with no member country located in quartile 1 of INDITEC. Only 5% of member countries (2 out of 38) are classified within quartile 2, a situation that remains unchanged for both reference fiscal periods (Figure 4).

Figure 4: Distribution of countries by INDITEC quartiles
Proportion of countries (as a percentage of the total) for selected groups of countries, year 2021



Source: Authors' elaboration based on ISORA 2022 Survey.

2.2. Individual results for CIAT member countries

After comparing the calculated mean values for different groupings of jurisdictions, it is of interest to go deeper into the data at an individual level where, presumably, the heterogeneity of cases in each of the analytical dimensions may be more evident. While calculations have been performed for the 174 participating countries in the ISORA 2022 Survey, the focus of analysis is on the 38 member countries of CIAT²². In the previous section, it was anticipated that this conglomerate, on average, attains values for various constructed indicators that surpass the global ISORA average. However, it is expected to find significant differences among the member countries, indicative of diverse situations regarding the digital transformation of their respective Tax Administrations. Naturally, this warrants the development of a more detailed²³ analysis.

Firstly, from the processing of responses provided by the 38 CIAT member countries, figures corresponding to the partial indices by dimensions for the fiscal periods 2019 and 2021 were obtained. This allowed to confirm both their evolution during the period marked by the COVID-19 pandemic and the existing gaps based on the most recent information (Table 4). For instance, in terms of technological innovation, despite some countries registering zero values, such as Bermuda and Guyana (indicative of lack of response in the selected variables), several others, including Brazil (0.94), Kenya (0.83), Argentina, France, and Mexico (0.78 in all three cases), stand out above the rest. A comparison of the results for the two reference periods reveals positive progress in 21 out of the 38 countries, although another significant number of countries (13) also exhibit a decline in this partial indicator.

Regarding the incorporation of advanced tools to improve tax compliance, there is also a notable disparity among individual scores for this indicator, with some cases standing out, such as Argentina, Ecuador, and Kenya, which attain the feasible maximum (1.00). Between 2019 and 2021, a total of 15 countries experienced quantitative improvements, while another 15 CIAT member countries maintained the same numerical values.

²² However, at the end of this document (Table A.1), a statistical annex can be found, containing detailed information on the results, by INDITEC dimension and overall, INDITEC quartile, response rates on the 30 selected variables and “INDITEC 2” index for the 174 ISORA 2022 participating countries and for the fiscal periods 2019 and 2021.

²³ By way of illustration, of the 38 CIAT member countries, 14 of them (37%) correspond to the “High Income” group, 15 (39%) are classified as “Upper-Middle Income” and 9 (24%) belong to the “Lower-Middle Income” group, with no identifiable cases of “Low Income” countries. Furthermore, although the majority of CIAT countries correspond to the Latin America and Caribbean region, representatives from most regions of the planet can also be identified, with the sole exception of East Asia and the Pacific. Finally, 11 of the 38 CIAT member countries are also OECD members.

The situation is somewhat different concerning operational digitalization, where a substantial majority of cases (25 out of 38) achieved increases in the partial index between those fiscal years. Additionally, with few exceptions, CIAT member countries exhibit relatively high scores in this area, reflecting the relevance attributed to it by their respective Tax Administrations in recent years. The best results from the index specifically focused on the digitalization of operational processes are observed in cases such as Argentina, Brazil, Costa Rica, Ecuador, Spain, Italy, Peru, Portugal, and the Dominican Republic, all with figures exceeding 0.90 in 2021 (Table 4).

Finally, in line with what has been commented about the average levels for different groups of jurisdictions, the analysis at the individual level in the dimension referring to available resources and the strategic use of the TA budget shows two singular characteristics: on the one hand, a smaller dispersion of values (between 0.47 for Kenya and 0.87 for the Dominican Republic) and, on the other hand, a greater proportion of countries with a regression in the indicator (22 out of 38). The latter does not necessarily imply a worse performance since it could be suggesting greater efficiency in the management of available resources according to the variables analyzed with source in ISORA. As for fiscal year 2021, the figures achieved by the Dominican Republic (0.87), Paraguay (0.83) and the Netherlands (0.79) stand out from the rest).

Table 4: INDITEC partial indexes by dimensions of analysis
Individual data for CIAT member countries
(participants in ISORA 2022), years 2019 and 2021

CODE	CIAT COUNTRIES	Technological Innovation		Compliance Improvement		Operational Digitalization		Resources and Budget	
		2019	2021	2019	2021	2019	2021	2019	2021
AGO	Angola	0.50	0.50	0.00	0.50	0.55	0.55	0.50	0.54
ARG	Argentina	0.25	0.78	0.50	1.00	0.85	0.96	0.69	0.65
ABW	Aruba	0.00	0.17	0.00	0.50	0.55	0.55	0.71	0.73
BRB	Barbados	0.31	0.33	0.50	0.33	0.68	0.76	0.90	0.71
BLZ	Belize	0.13	0.22	0.17	0.33	0.00	0.00	0.60	0.58
BMU	Bermuda	0.00	0.00	0.00	0.00	0.24	0.24	0.59	0.61
BOL	Bolivia	0.38	0.44	0.33	0.83	0.68	0.68	0.76	0.70
BRA	Brazil	0.63	0.94	0.50	0.83	0.96	0.99	0.70	0.59
CAN	Canada	0.69	0.61	0.33	0.33	0.82	0.86	0.66	0.60
CHL	Chile	0.38	0.72	0.83	0.83	0.73	0.75	0.63	0.64
COL	Colombia	0.81	0.67	0.50	0.67	0.75	0.81	0.69	0.65
CRI	Costa Rica	0.63	0.56	0.17	0.33	0.87	0.93	0.78	0.67
CUB	Cuba	0.00	0.39	0.00	0.17	0.27	0.27	0.64	0.66
DOM	Dominican Rep.	0.63	0.44	0.50	0.50	0.94	0.95	0.75	0.87
ECU	Ecuador	0.38	0.39	0.83	1.00	0.99	0.99	0.71	0.70
SLV	El Salvador	0.00	0.33	0.33	0.33	0.66	0.82	0.60	0.60
FRA	France	0.50	0.78	0.67	0.67	0.82	0.89	0.54	0.55
GTM	Guatemala	0.50	0.56	0.50	0.67	0.86	0.89	0.61	0.59
GUY	Guyana	0.00	0.00	0.17	0.00	0.19	0.27	0.68	0.63
HND	Honduras	0.38	0.50	0.00	0.50	0.69	0.70	0.67	0.69
IND	India	0.63	0.56	0.67	0.67	0.69	0.68	0.57	0.61
ITA	Italy	0.44	0.61	0.83	0.83	0.85	0.92	0.68	0.67
JAM	Jamaica	0.25	0.33	0.50	0.50	0.66	0.81	0.75	0.70
KEN	Kenya	0.88	0.83	1.00	1.00	0.84	0.88	0.52	0.47
MEX	Mexico	0.63	0.78	0.83	0.83	0.74	0.79	0.52	0.63
MAR	Morocco	0.31	0.56	0.33	0.17	0.84	0.80	0.70	0.68
NLD	Netherlands	0.69	0.67	0.67	0.67	0.84	0.83	0.86	0.79
NIC	Nicaragua	0.25	0.22	0.17	0.00	0.67	0.68	0.67	0.71
NGA	Nigeria	0.56	0.39	0.17	0.50	0.20	0.44	0.65	0.62
PAN	Panama	0.13	0.33	0.17	0.50	0.61	0.77	0.50	0.50
PRY	Paraguay	0.25	0.11	0.33	0.17	0.98	0.84	0.76	0.83
PER	Peru	0.69	0.72	0.67	0.67	0.93	0.95	0.71	0.71
PRT	Portugal	0.50	0.50	0.50	0.50	0.83	0.90	0.69	0.66
ESP	Spain	0.75	0.72	0.67	0.83	1.00	1.00	0.62	0.63
SUR	Suriname	0.00	0.22	0.50	0.17	0.12	0.20	0.63	0.66
TTO	Trinidad and Tobago	0.50	0.44	0.33	0.17	0.84	0.82	0.65	0.61
USA	United States	0.69	0.72	0.33	0.33	0.58	0.59	0.60	0.57
URY	Uruguay	0.75	0.67	0.50	0.50	0.83	0.77	0.62	0.61

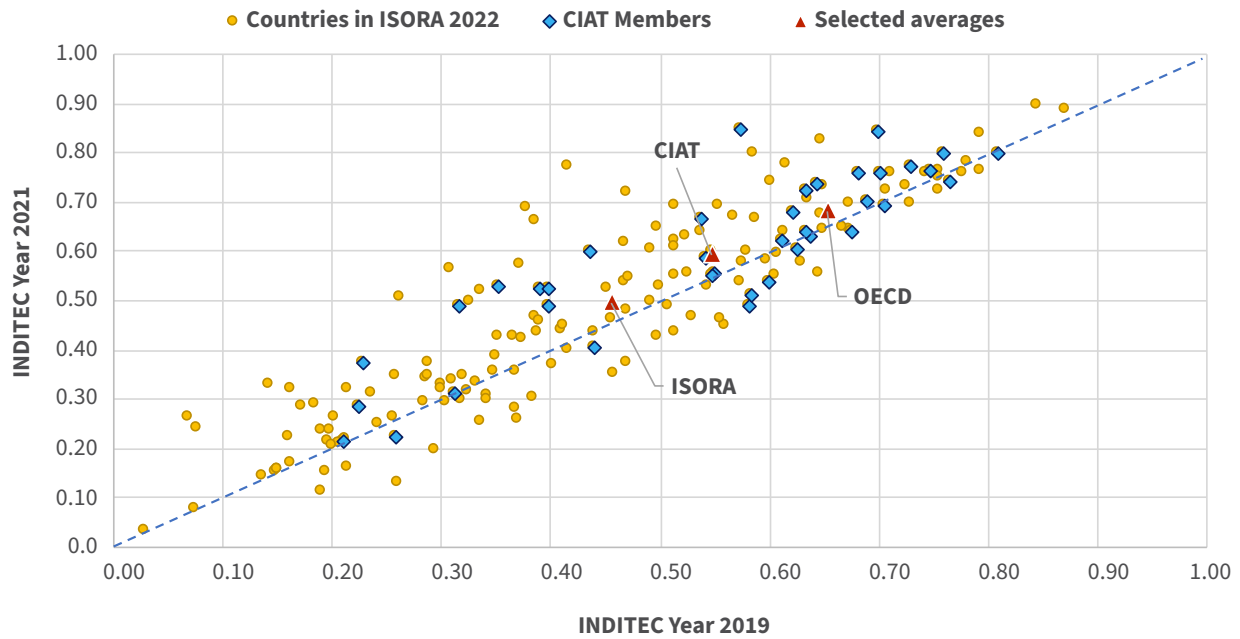
Source: Authors' elaboration based on ISORA 2022 Survey.

Note: In the cells of the table, green color indicates a positive variation between 2019 and 2021 for each indicator, yellow color indicates cases with no variation, and red color highlights cases where there was a decrease between those years.

The INDITEC index scores for each of the CIAT member countries and for fiscal years 2019 and 2021 were obtained from the aggregation -with equivalent weightings- of the individual indexes by dimension of analysis. As noted, the availability of these results has allowed the ordering of the cases in a ranking and the determination of classification quartiles for the entire universe of jurisdictions participating in ISORA 2022 and for each of the periods considered. Thus, while maintaining the necessary caution due to the statistical limitations of the database used, this procedure is able to provide a quick and effective picture of the current situation (in comparable quantitative terms, according to the index value, and in relative terms, according to the corresponding quartile) of TAs in CIAT members in terms of digitalization and technological innovation applied to tax management, both before and after the COVID-19 pandemic.

In that regard, as demonstrated with the mean values presented in the preceding section and as will be elaborated upon in more detail here, CIAT member countries stand out within the ISORA universe not only for their relative position in the calculated INDITEC ranking for the most recent period but also for achieving significant progress across all dimensions of analysis, particularly in the overall INDITEC index between the fiscal years 2019 and 2021. In Figure 5, highlighting the data for CIAT countries for the fiscal year 2021 on the vertical axis and corresponding to the fiscal year 2019 on the horizontal axis, it can be observed that the majority of them (27 out of 38) are positioned above the 45-degree line. This indicates a substantial relative improvement achieved during the years of the COVID-19 pandemic, aligning with the general trend for the ISORA universe, both at the individual level and for selected averages.

Figure 5: Comparison of the INDITEC global index between two reference periods
Individual data (CIAT and ISORA countries)
and averages for country groups, years 2019 and 2021



Source: Authors' elaboration based on ISORA 2022 Survey.

More specifically, the figures for year 2021 (Table 5) show a wide gap between CIAT member countries, within a range that finds its lowest values in the cases of Bermuda (0.21), Guyana (0.22), Belize (0.28) and Suriname (0.31), and its highest values in those of Spain (0.80), Kenya (0.80), Brazil (0.84) and Argentina (0.85). As mentioned above, a comparison with the values calculated for 2019 shows that the INDITEC index increased between the two reference years for most of the member countries, with some salient cases such as Angola (from 0.39 to 0.52), Argentina (from 0.57 to 0.85), Aruba (0.32 to 0.49), Bolivia (0.54 to 0.66), Brazil (0.70 to 0.84), Cuba (0.23 to 0.37), El Salvador (0.40 to 0.52), Honduras (0.43 to 0.60), and Panama (0.35 to 0.53). In contrast, decreases with respect to INDITEC between 2019 and 2021 occurred in only 11 member countries. However, especially in relation to those negative variations, some necessary caution must be kept when weighing these changes since they are derived directly from the accumulated responses collected through ISORA 2022, which i) may contain a certain margin of error or omission between different years, ii) do not necessarily reflect the real degree of technological development in the different collection agencies; and iii) are not exempt from being affected by changes in exogenous variables that are beyond the control of the TAs themselves in different latitudes.

Furthermore, the ordering of the individual scores shows an auspicious concentration of CIAT members within the two highest quartiles of the ISORA universe (28 of 38 countries between quartiles 3 and 4). When comparing the relative position of these countries in the ranking for the two fiscal years taken as a reference, some movements can be observed in both directions and in each of the determined quartiles, although 23 of the 38 countries did not show any changes in their respective classification (Table 5). For example, Cuba moved up from quartile 1 to 2 and Angola, El Salvador, Honduras, and Panama moved from 2 to 3. At somewhat higher levels, a group of five countries (Canada, Costa Rica, India, Portugal, and Uruguay) moved from quartile 4 to 3, although with marginal changes. This is also true for Bolivia, but in the opposite direction, moving to the highest quartile, in addition to the case of Argentina, which shows a very significant rise that has placed it at the top of the INDITEC ranking for fiscal year 2021²⁴.

Finally, it should be emphasized that, in general, all surveyed countries have a very high response rate for the 30 quantitative and qualitative variables that make up the INDITEC global index. Regarding the data for 2021, this percentage reaches or exceeds 90% in the vast majority of cases, with only 7 countries below this reference value. With respect to the figures for 2019, 10 countries increased the positive response rate, 11 of them reduced it, while the remaining 16 maintained the values between the two fiscal periods.

²⁴ However, it should be noted that some of the relative changes in the INDITEC ranking may be influenced both by the addition of new countries to the ISORA universe in its 2022 edition and by the substantial improvement in the overall response rates for the selected variables.

Table 5: INDITEC global index, quartiles, and overall response rates (in percentages)
Individual data for CIAT member countries, years 2019 and 2021

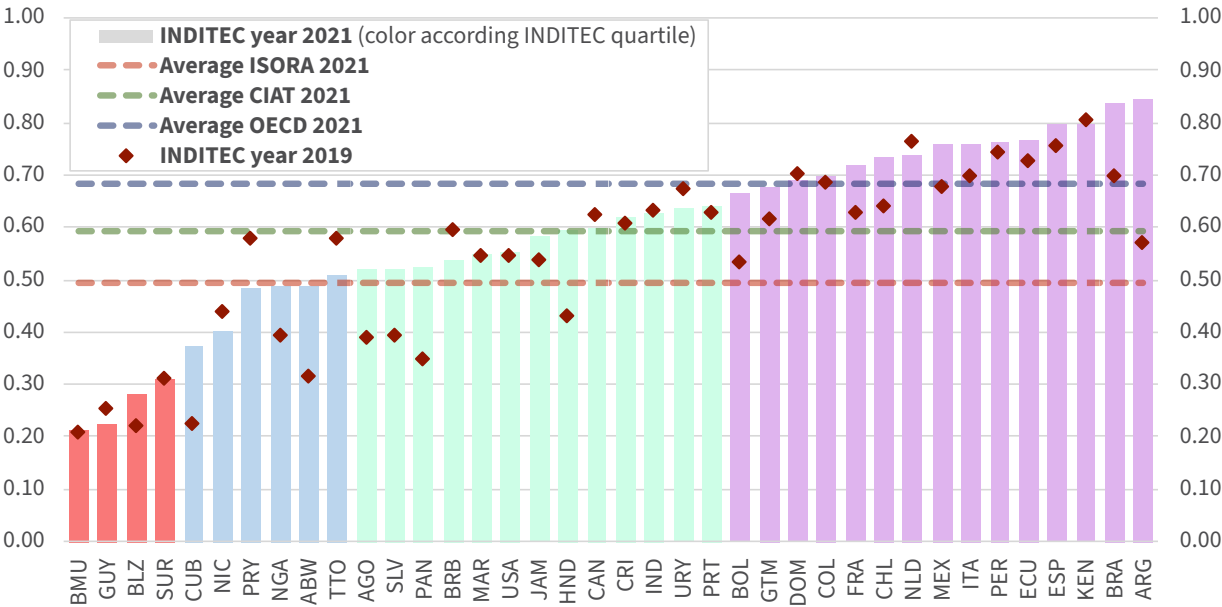
CODE	CIAT COUNTRIES	INDITEC		INDITEC Quartile		Response Rate	
		2019	2021	2019	2021	2019	2021
AGO	Angola	0.39	0.52	2	3	90%	83%
ARG	Argentina	0.57	0.85	3	4	100%	100%
ABW	Aruba	0.32	0.49	2	2	53%	93%
BRB	Barbados	0.60	0.54	3	3	100%	100%
BLZ	Belize	0.22	0.28	1	1	93%	93%
BMU	Bermuda	0.21	0.21	1	1	53%	87%
BOL	Bolivia	0.54	0.66	3	4	97%	100%
BRA	Brazil	0.70	0.84	4	4	100%	100%
CAN	Canada	0.62	0.60	4	3	93%	93%
CHL	Chile	0.64	0.74	4	4	97%	97%
COL	Colombia	0.69	0.70	4	4	100%	93%
CRI	Costa Rica	0.61	0.62	4	3	100%	100%
CUB	Cuba	0.23	0.37	1	2	53%	97%
DOM	Dominican Rep.	0.70	0.69	4	4	100%	97%
ECU	Ecuador	0.73	0.77	4	4	100%	100%
SLV	El Salvador	0.40	0.52	2	3	100%	73%
FRA	France	0.63	0.72	4	4	90%	83%
GTM	Guatemala	0.62	0.68	4	4	100%	90%
GUY	Guyana	0.26	0.22	1	1	100%	83%
HND	Honduras	0.43	0.60	2	3	100%	100%
IND	India	0.64	0.63	4	3	87%	97%
ITA	Italy	0.70	0.76	4	4	100%	100%
JAM	Jamaica	0.54	0.58	3	3	100%	100%
KEN	Kenya	0.81	0.80	4	4	100%	90%
MEX	Mexico	0.68	0.76	4	4	97%	90%
MAR	Morocco	0.55	0.55	3	3	100%	100%
NLD	Netherlands	0.76	0.74	4	4	100%	100%
NIC	Nicaragua	0.44	0.40	2	2	100%	97%
NGA	Nigeria	0.40	0.49	2	2	93%	90%
PAN	Panama	0.35	0.53	2	3	87%	83%
PRY	Paraguay	0.58	0.49	3	2	93%	100%
PER	Peru	0.75	0.76	4	4	100%	100%
PRT	Portugal	0.63	0.64	4	3	100%	100%
ESP	Spain	0.76	0.80	4	4	97%	100%
SUR	Suriname	0.31	0.31	2	1	70%	87%
TTO	Trinidad and Tobago	0.58	0.51	3	2	90%	93%
USA	United States	0.55	0.55	3	3	93%	93%
URY	Uruguay	0.67	0.64	4	3	97%	100%

Source: Authors' elaboration based on ISORA 2022 Survey.

Note: In the cells of the table, green color indicates a positive variation between 2019 and 2021 for each indicator, yellow color indicates cases with no variation, and red color highlights cases where there was a decrease between those years.

The following Figure 6 provides a clearer and more comprehensive view of individual results for the 38 member countries of CIAT participating in ISORA 2022, as well as the relative position of each in the INDITEC ranking constructed from the scores corresponding to the fiscal year 2021. On one hand, it is evident that all CIAT countries placed in quartiles 3 and 4 (including Trinidad and Tobago in quartile 2) achieve INDITEC values above the global average for the total of 174 countries surveyed in ISORA. Additionally, nearly all CIAT countries in quartile 4 of the INDITEC ranking, excluding Bolivia and Guatemala, attain synthetic index figures surpassing the average of OECD member countries, which could be considered at the forefront of these aspects of tax administration at the international level. Outstanding cases include Brazil, Kenya, Spain, Ecuador, Peru, Italy, and Mexico, all with INDITEC values exceeding 0.75 in the most recent period (Figure 6). The progress of most CIAT countries, across all quartiles and with few exceptions, is also confirmed in comparison to the results for fiscal year 2019, prior to the COVID-19 pandemic.

Figure 6: Ranking of the INDITEC global index for 2021 differentiated by quartiles
CIAT member countries and selected averages for country groups, years 2019 and 2021



Source: Authors' elaboration based on ISORA 2022 Survey.

Note: The color of the individual bars corresponds to the quartile of each jurisdiction according to the INDITEC global ranking for fiscal year 2021 (the references coincide with those presented in Figure 4 in the previous section).

As explained in the methodology specified in a previous section and in order to check the robustness of the individual results, an alternative index (INDITEC 2) was also calculated, concentrating the analysis on the technological aspects associated with the digital transformation of the TAs²⁵.

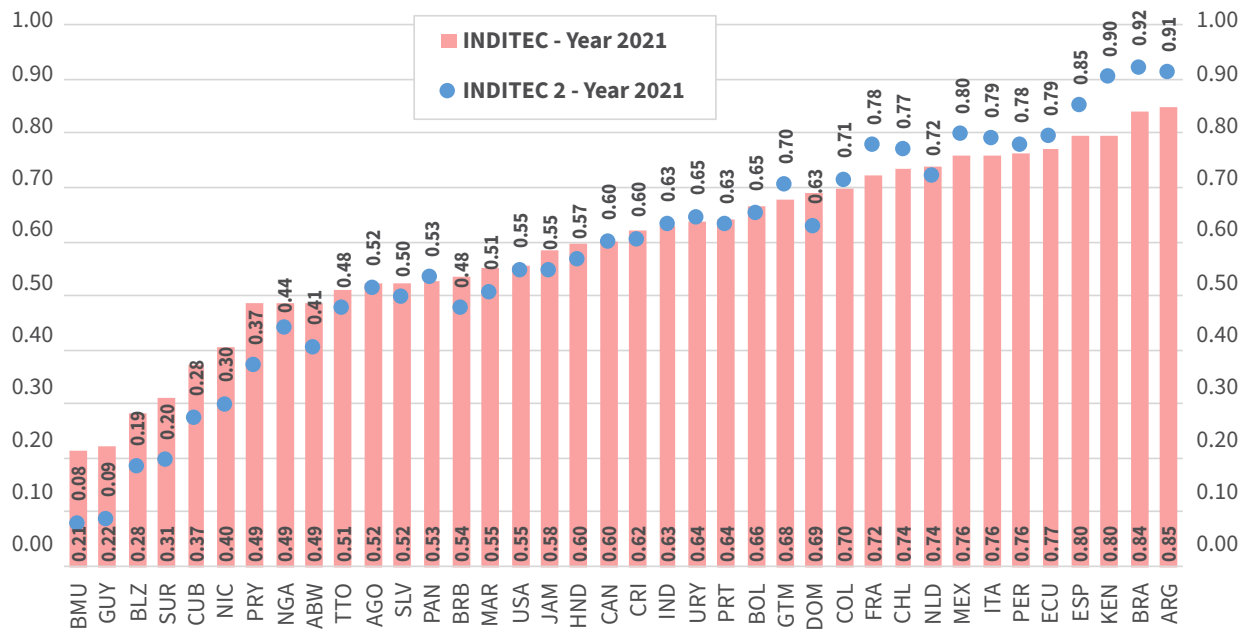
Taking normalized data for the fiscal year 2021 as a reference, a regularity deserving attention was observed. For countries with relatively low scores on the original INDITEC index (e.g., those in quartiles 1 and 2), individual values of INDITEC 2 turn out to be somewhat lower than the former. In cases with an intermediate level of INDITEC, both versions of the index are comparable and, in general, yield very similar results. Conversely, for countries with high levels of INDITEC (particularly those in quartile 4), the alternative version of the index surpasses the original in all instances, widening the gaps compared to other CIAT countries with more constrained values (Figure 7).

The aforementioned phenomenon is explained by the distinct definition of both versions of the synthetic index: INDITEC 2 does not take into account, in its calculation, the dimension of “resources and budget” which, in particular, exhibits a lower dispersion of individual data for CIAT countries (Table 4) and closer average values among various country groups (Table 1 and Figure 1). Therefore, by not including this dimension, the gaps between countries accumulated in the other dimensions of analysis (technological innovation, compliance improvement, and operational digitalization), as well as in the synthetic index INDITEC 2, are heightened, with a range of values for the year 2021 spanning from 0.08 (Bermuda) to 0.92 (Brazil). Nevertheless, the statistical consistency of INDITEC is reinforced since the identified trends in terms of the levels and the order of countries in the ranking²⁶ remain broadly the same for both formulations.

25 The calculated INDITEC 2 values for the 174 ISORA 2022 participating jurisdictions and for fiscal years 2019 and 2021 are presented in the Statistical Annex at the end of this document.

26 Once INDITEC 2 was calculated for the entire ISORA 2022 universe, new quartiles were determined which, for the 2021 fiscal year, were determined as follows: quartile 1, from 0 to 0.24; quartile 2, from 0.24 to 0.48; quartile 3, from 0.48 to 0.65; and quartile 4, from 0.65 to 0.92. Thus it was found that the ranking of the CIAT countries is not substantially modified with the alternative version of the synthetic indicator, except for a repositioning in the cases of Trinidad and Tobago (moving up from quartile 2 to 3) and the Dominican Republic (moving down from quartile 4 to 3).

Figure 7: INDITEC global index (original) and INDITEC 2 (alternative, without “resources and budget”) Individual data for CIAT member countries, year 2021



Source: Authors’ elaboration based on ISORA 2022 Survey.

Note: The labels at the base of the figure correspond to the original INDITEC figures for fiscal year 2021 (columns), according to which the countries are ordered from smallest to largest.

As can be seen throughout this last section of the document, the INDITEC results for CIAT member countries participating in ISORA 2022 are within reasonable margins and serve to point out some differences (and their recent evolution) that find a certain correlation in practice. In general, the figures are indicative of the relative degree of progress of the respective TAs in the implementation and use of technological innovations (including those aimed at improving tax compliance), in the relative digitalization of their main operational processes and in the strategic management of their human and financial resources in the same direction. In addition, the availability of accumulated information for several fiscal years, with a unified questionnaire and consolidated methodological criteria, offers the chance to continuously monitor the state of affairs in different countries along different dimensions of analysis and even, as has been emphasized here, to identify changes or reinforcements of reform trends in the area of tax administration at the international level in the face of such an extraordinary and disruptive event as the COVID-19 pandemic.

However, the likely existence of some exceptions and certain nuances that should be considered is acknowledged. For instance, the placement of Canada or the United States in quartile 3, associated with modest results in “compliance improvement” should not be interpreted negatively due to a lack of effectiveness or technological obsolescence. Precisely, these are countries with relatively low levels of non-compliance, notwithstanding the variety of advanced techniques they employ to achieve it. Additionally, it should be noted that many of the variables selected for the construction of INDITEC may be influenced by hard-to-quantify exogenous factors, or their variations may be linked to internal processes that, generally, are not captured through the ISORA Survey. Therefore, all results, as well as quantitative changes between different periods, should be approached with due caution when drawing conclusions. It is essential to consider that the underlying information comes directly from the tax authorities themselves and is not exempt from containing some statistical inaccuracies (which is why the proposed methodology includes certain preliminary statistical adjustments).

In any case, the INDITEC index is a novel way of synthesizing the relative degree of progress in the main dimensions of the digital transformation process of different TAs around the world, taking advantage of the vast information gathered through ISORA. As with any benchmarking method, there are certain relative advantages and disadvantages compared to other alternatives such as, for example, those based on the establishment of compliance standards or on external expert assessment. In this sense, INDITEC intends to complement and strengthen the existing instruments, understanding the relevance that benchmarking has acquired in recent years as a technical diagnostic tool for TAs.

Predictably, INDITEC’s statistical dependence on the information provided by the tax agencies in each edition of the ISORA Survey represents, at the same time, its main advantage and disadvantage. On the one hand, the calculation of the synthetic index is based on data that, in most cases, could only be generated, processed, and provided by the TAs themselves (since they are not of a public nature due to their sensitivity and respect for tax secrecy rules). In addition, the information corresponds to the routine activities of the TAs and is derived directly from their operational performance, as opposed to what could be obtained through an exceptional evaluation under external parameters that generally require some adaptation and preparatory work.

Conversely, the synthetic index depends on two factors that influence the quality and representativeness of the results: a) the response rate of the TAs for each of the questions or information requirements that constitute the fundamental basis of the selected variables that make up INDITEC, and b) the veracity and accuracy of these responses to guarantee reliable and precise results. However, both potential weaknesses could be gradually minimized in future editions of ISORA as the interest of the countries in obtaining a rapid and comparative comprehensive diagnosis of the degree of progress, with a certain time perspective, of the digitalization and technological innovation processes in their respective TAs increases.

In turn, the responses processed for a significant number of variables included in INDITEC (particularly those related to technological innovation and compliance improvement) are indicative of the effective use of a set of advanced tools and techniques. However, the results should not be taken to infer the degree of sophistication, maturity, accumulated knowledge, or internal diffusion of these techniques at the institutional level (which is beyond the current scope of the ISORA survey). Although its complexity is recognized, this could be explored through a greater precision in the questionnaires or, eventually, through some reciprocal system of verification or external review of the information provided by each agency under homogeneous and standardized parameters. The high degree of participation of the 174 jurisdictions in the most recent edition of ISORA is auspicious in this sense and the planning of future editions opens up possible lines of future work to continue improving and consolidating this valuable tool.

3 Concluding remarks

This report updates and refines the methodology of construction and the effective calculation of INDITEC as a synthetic index designed to comparatively evaluate the relative progress of different TAs across the planet in terms of technological innovation and digital transformation.

This innovative indicator is the result of the multiple possibilities of taking advantage from the extensive information collected through the ISORA Survey in its most recent edition (2022), which has established itself as a valuable tool for generating diagnoses in tax administration with an international comparative perspective. In fact, the grouping of jurisdictions according to different classification criteria (geographic region, income level, CIAT or OECD membership) allows identifying trends and stylized facts in specific aspects, in addition to providing benchmarks for the rest of the countries and a clear picture of the existing gaps between them in different areas of their respective tax agencies.

Firstly, obtaining the INDITEC index for the 174 jurisdictions participating in ISORA 2022 required the design of a robust calculation methodology. In its original version, priority was given to the balance between the four dimensions analyzed (“technological innovation”, “compliance improvement”, “operational digitalization” and “resources and budget”), the representativeness of the variables selected from the ISORA database and the homogeneity of the available information through statistical standardization techniques. In this new edition of INDITEC some improvements have been introduced, such as the addition of a new variable (reaching 30 in number) and the reformulation of some previously considered variables.

In addition, special emphasis was placed on the selection of the available figures in order to have two time reference points (fiscal years 2019 and 2021) in order to evaluate the possible changes that occurred during the years most affected by the COVID-19 pandemic, presuming a certain acceleration - in a forced or planned manner - in the implementation of various innovative practices that contribute to the digital transformation of TAs. Again, two alternative definitions of INDITEC were proposed to test the robustness of the obtained results by isolating the relative weight of the “resources and budget” dimension in the calculation of the overall synthetic index.

A first conclusion that can be drawn is that, in general, figures suggest significant progress in terms of innovation, digitalization and technology applied to tax administration between the period prior to the COVID-19 pandemic and the period after that event. This could be seen both in the main dimensions analyzed (except for “resources and budget”) and in the overall INDITEC index for most of the countries.

However, in terms of levels, it was also possible to confirm the significant differences that exist - and persist despite progress - among different groups of countries. In this regard, a clear positive relationship was identified between the calculated indicators (by dimensions and total INDITEC) and their respective income levels. The average scores for CIAT member countries, as a group, stand close to those calculated for developed OECD countries. The calculation of the alternative INDITEC 2 index allowed for the confirmation of the mentioned trends and reinforces its explanatory capacity. Meanwhile, the analysis of the distribution of countries by INDITEC quartiles (after establishing an individual ranking based on the absolute value for each fiscal year) provided an additional perspective to assess the particular situation and relative position of jurisdictions participating in ISORA 2022.

At the individual level, the 38 CIAT member countries for which updated information was available show, in principle, high heterogeneity in each of the partial dimensions considered. When comparing the results between 2019 and 2021, the most widespread progress was in the areas of operational digitalization and technological innovation. For the INDITEC index, the same considerations are repeated, both for the gaps between countries and for the quantitative improvements in most cases.

Beyond noting some changes in relative position between the two reference periods, for the fiscal year 2021 the majority of CIAT countries are situated in the top two quartiles, surpassing the global average of ISORA, with several of them prominently placed in the global ranking, exceeding the calculated average for OECD countries. Meanwhile, the calculation of INDITEC 2, in addition to reaffirming conclusions about the levels and ranking of countries, has illustrated the unequal relative weight of the “resources and budget” dimension among CIAT countries (being related to the response percentage for all selected variables, which also saw an increase between 2019 and 2021).

Whether due to the weaknesses or inaccuracies that the database itself may contain or carry over from the processed questionnaires of the ISORA Survey, or due to the limitations of the proposed calculation methodology, the interpretation of the results and the drawing of general conclusions from them will always require a reasonable level of caution. It should also be remembered that the synthetic index is indicative of the effective use (sometimes in an exploratory mode) of the most advanced techniques for efficient tax management and, therefore, it does not allow to fully infer the effective and different degree of technological and institutional development of the TAs in a given tax year.

Despite these caveats, this new edition of the INDITEC index, on the one hand, successfully reaffirms its validity as a practical diagnostic method for tax authorities worldwide as regards digital transformation across its various dimensions. Simultaneously, the dynamic analysis with a temporal perspective -incorporated in this document - has allowed the confirmation of encouraging advancements recorded in the post-pandemic era, both globally and specifically for CIAT countries. This only serves to strengthen the utility and potential of INDITEC as a tool for international comparative assessment and benchmarking.

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Statistical Appendix: Results for ISORA 2022 participating countries

Table A.1: INDITEC partial and global indexes, INDITEC quartile, response rate and INDITEC 2
Participating jurisdictions in ISORA 2022 (CIAT members in bold type), fiscal years 2019 and 2021

Code	ISORA Countries	TECHNOLOGICAL INNOVATION		COMPLIANCE IMPROVEMENT		OPERATIONAL DIGITALIZATION		RESOURCES AND BUDGET		INDITEC (TOTAL)		INDITEC QUARTILE		RESPONSE RATE		INDITEC 2	
		2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021
AFG	Afghanistan, Islamic Republic of	0.00	0.00	0.17	0.17	0.00	0.00	0.97	1.00	0.28	0.29	1	1	83%	60%	0.06	0.06
ALB	Albania	0.13	0.28	0.50	1.00	0.90	0.89	0.93	0.93	0.62	0.77	4	4	100%	100%	0.51	0.72
AGO	Angola	0.50	0.50	0.00	0.50	0.55	0.55	0.50	0.54	0.39	0.52	2	3	90%	83%	0.35	0.52
ATG	Antigua and Barbuda	0.13	0.11	0.00	0.00	0.00	0.09	0.66	0.64	0.20	0.21	1	1	97%	97%	0.04	0.07
ARG	Argentina	0.25	0.78	0.50	1.00	0.85	0.96	0.69	0.65	0.57	0.85	3	4	100%	100%	0.53	0.91
ARM	Armenia, Republic of	0.50	0.44	0.50	0.67	0.84	0.84	0.74	0.74	0.65	0.67	4	4	97%	100%	0.61	0.65
ABW	Aruba	0.00	0.17	0.00	0.50	0.55	0.55	0.71	0.73	0.32	0.49	2	2	53%	93%	0.18	0.41
AUS	Australia	0.94	0.89	0.67	0.67	0.84	0.84	0.66	0.64	0.78	0.76	4	4	87%	100%	0.82	0.80
AUT	Austria	0.63	0.67	0.67	0.67	0.62	0.67	0.68	0.57	0.65	0.64	4	3	97%	97%	0.64	0.67
AZE	Azerbaijan, Republic of	0.13	0.44	0.33	0.33	0.66	0.80	0.85	0.83	0.49	0.60	3	3	90%	87%	0.37	0.53
BGD	Bangladesh	0.19	0.39	0.33	0.17	0.17	0.23	0.55	0.55	0.31	0.34	2	2	97%	73%	0.23	0.26
BRB	Barbados	0.31	0.33	0.50	0.33	0.68	0.76	0.90	0.71	0.60	0.54	3	3	100%	100%	0.50	0.48
BLR	Belarus	0.31	0.44	0.67	0.67	0.66	0.65	0.00	0.00	0.41	0.44	2	2	67%	67%	0.55	0.59
BEL	Belgium	0.69	0.67	0.67	0.67	0.96	0.97	0.70	0.73	0.75	0.76	4	4	97%	93%	0.77	0.77
BLZ	Belize	0.13	0.22	0.17	0.33	0.00	0.00	0.60	0.58	0.22	0.28	1	1	93%	93%	0.10	0.19
BEN	Benin	0.13	0.11	0.67	0.67	0.88	0.74	0.62	0.62	0.57	0.54	3	3	90%	100%	0.56	0.51
BMU	Bermuda	0.00	0.00	0.00	0.00	0.24	0.24	0.59	0.61	0.21	0.21	1	1	53%	87%	0.08	0.08
BTN	Bhutan	0.13	0.22	0.50	0.33	0.65	0.56	0.09	0.11	0.34	0.31	2	1	80%	80%	0.43	0.37
BOL	Bolivia	0.38	0.44	0.33	0.83	0.68	0.68	0.76	0.70	0.54	0.66	3	4	97%	100%	0.46	0.65
BIH	Bosnia and Herzegovina	0.00	0.00	0.00	0.00	0.39	0.41	0.64	0.63	0.26	0.26	1	1	93%	87%	0.13	0.14
BWA	Botswana	0.00	0.56	0.17	0.50	0.45	0.37	0.61	0.81	0.31	0.56	1	3	87%	90%	0.21	0.48
BRA	Brazil	0.63	0.94	0.50	0.83	0.96	0.99	0.70	0.59	0.70	0.84	4	4	100%	100%	0.70	0.92
BRN	Brunei	0.00	0.00	0.00	0.00	0.32	0.32	0.27	0.28	0.15	0.15	1	1	50%	70%	0.11	0.11
BGR	Bulgaria	0.38	0.39	0.33	0.50	0.90	0.94	0.84	0.72	0.61	0.64	4	3	100%	100%	0.54	0.61

Code	ISORA Countries	TECHNOLOGICAL INNOVATION		COMPLIANCE IMPROVEMENT		OPERATIONAL DIGITALIZATION		RESOURCES AND BUDGET		INDITEC (TOTAL)		INDITEC QUARTILE		RESPONSE RATE		INDITEC 2	
		2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021
BFA	Burkina Faso	0.00	0.28	0.00	0.67	0.35	0.35	0.70	0.73	0.26	0.50	1	2	53%	97%	0.12	0.43
BDI	Burundi	0.31	0.28	0.17	0.17	0.08	0.17	0.73	0.64	0.32	0.31	2	1	100%	90%	0.19	0.20
KHM	Cambodia	0.25	0.28	0.33	0.17	0.31	0.33	0.71	0.69	0.40	0.37	2	2	80%	80%	0.30	0.26
CMR	Cameroon	0.13	0.11	0.67	0.67	0.47	0.47	0.49	0.48	0.44	0.43	2	2	63%	80%	0.42	0.42
CAN	Canada	0.69	0.61	0.33	0.33	0.82	0.86	0.66	0.60	0.62	0.60	4	3	93%	93%	0.61	0.60
CPV	Cape Verde	0.00	0.00	0.17	0.33	0.66	0.14	0.64	0.64	0.37	0.28	2	1	97%	97%	0.28	0.16
CAF	Central African Republic	0.13	0.00	0.67	0.83	0.00	0.00	0.60	0.59	0.35	0.35	2	2	100%	90%	0.26	0.28
TCD	Chad	0.19	0.06	0.33	0.17	0.00	0.00	0.24	0.23	0.19	0.11	1	1	80%	70%	0.17	0.07
CHL	Chile	0.38	0.72	0.83	0.83	0.73	0.75	0.63	0.64	0.64	0.74	4	4	97%	97%	0.65	0.77
CHN	China	0.75	0.67	0.50	0.67	0.33	0.37	0.52	0.52	0.52	0.55	3	3	87%	87%	0.53	0.57
COL	Colombia	0.81	0.67	0.50	0.67	0.75	0.81	0.69	0.65	0.69	0.70	4	4	100%	93%	0.69	0.71
COM	Comoros	0.19	0.33	0.33	0.50	0.08	0.00	0.80	0.86	0.35	0.42	2	2	93%	87%	0.20	0.28
COD	Congo, Democratic Republic of	0.00	0.22	0.00	0.33	0.00	0.08	0.31	0.32	0.08	0.24	1	1	87%	67%	0.00	0.21
COG	Congo, Republic of	0.25	0.22	0.50	0.83	0.15	0.16	0.64	0.66	0.38	0.47	2	2	73%	93%	0.30	0.40
COK	Cook Islands	0.00	0.11	0.33	0.17	0.30	0.45	0.57	0.59	0.30	0.33	1	2	97%	97%	0.21	0.24
CRI	Costa Rica	0.63	0.56	0.17	0.33	0.87	0.93	0.78	0.67	0.61	0.62	4	3	100%	100%	0.55	0.60
HRV	Croatia	0.13	0.61	0.50	0.67	0.78	0.79	0.81	0.70	0.55	0.69	3	4	97%	97%	0.47	0.69
CUB	Cuba	0.00	0.39	0.00	0.17	0.27	0.27	0.64	0.66	0.23	0.37	1	2	53%	97%	0.09	0.28
CYP	Cyprus	0.13	0.11	0.50	0.50	0.55	0.59	0.65	0.64	0.46	0.46	2	2	97%	97%	0.39	0.40
CZE	Czech Republic	0.50	0.44	0.50	0.33	0.70	0.71	0.72	0.70	0.60	0.55	3	3	100%	100%	0.57	0.50
DNK	Denmark	0.88	1.00	0.50	0.67	1.00	0.99	1.00	0.91	0.84	0.89	4	4	93%	100%	0.79	0.89
DMA	Dominica	0.13	0.00	0.00	0.17	0.02	0.02	0.65	0.75	0.20	0.23	1	1	90%	83%	0.05	0.06
DOM	Dominican Republic	0.63	0.44	0.50	0.50	0.94	0.95	0.75	0.87	0.70	0.69	4	4	100%	97%	0.69	0.63
ECU	Ecuador	0.38	0.39	0.83	1.00	0.99	0.99	0.71	0.70	0.73	0.77	4	4	100%	100%	0.73	0.79
SLV	El Salvador	0.00	0.33	0.33	0.33	0.66	0.82	0.60	0.60	0.40	0.52	2	3	100%	73%	0.33	0.50
EST	Estonia	0.63	0.56	0.33	0.33	0.86	0.87	0.56	0.56	0.60	0.58	3	3	100%	100%	0.61	0.59
SWZ	Eswatini	0.56	0.33	0.00	0.00	0.19	0.65	0.71	0.71	0.37	0.42	2	2	100%	100%	0.25	0.33
ETH	Ethiopia	0.50	0.44	0.50	0.50	0.19	0.18	0.29	0.30	0.37	0.36	2	2	73%	63%	0.40	0.38
FJI	Fiji	0.25	0.28	0.33	0.50	0.19	0.43	0.78	0.62	0.39	0.46	2	2	93%	97%	0.26	0.40
FIN	Finland	0.75	0.78	0.50	0.67	0.83	0.86	0.76	0.73	0.71	0.76	4	4	100%	100%	0.69	0.77
FRA	France	0.50	0.78	0.67	0.67	0.82	0.89	0.54	0.55	0.63	0.72	4	4	90%	83%	0.66	0.78

Code	ISORA Countries	TECHNOLOGICAL INNOVATION		COMPLIANCE IMPROVEMENT		OPERATIONAL DIGITALIZATION		RESOURCES AND BUDGET		INDITEC (TOTAL)		INDITEC QUARTILE		RESPONSE RATE		INDITEC 2	
		2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021
GAB	Gabon	0.00	0.06	0.00	0.17	0.36	0.36	0.78	0.77	0.28	0.34	1	2	70%	93%	0.12	0.19
GMB	Gambia	0.00	0.33	0.00	0.17	0.22	0.13	0.52	0.52	0.18	0.29	1	1	70%	90%	0.07	0.21
GEO	Georgia	0.50	0.61	0.33	0.50	0.72	0.88	0.71	0.69	0.57	0.67	3	4	100%	100%	0.52	0.66
DEU	Germany	0.13	0.61	0.33	0.50	0.77	0.77	0.76	0.71	0.50	0.65	3	3	97%	97%	0.41	0.63
GHA	Ghana	0.56	0.06	0.67	0.67	0.00	0.14	0.65	0.63	0.47	0.37	3	2	97%	93%	0.41	0.29
GRC	Greece	0.44	0.61	0.33	0.33	0.68	0.92	0.65	0.65	0.52	0.63	3	3	100%	100%	0.48	0.62
GRD	Grenada	0.00	0.00	0.00	0.00	0.19	0.23	0.63	0.60	0.21	0.21	1	1	87%	100%	0.06	0.08
GTM	Guatemala	0.50	0.56	0.50	0.67	0.86	0.89	0.61	0.59	0.62	0.68	4	4	100%	90%	0.62	0.70
GIN	Guinea	0.00	0.06	0.00	0.00	0.17	0.50	0.68	0.72	0.21	0.32	1	1	87%	97%	0.06	0.19
GNB	Guinea-Bissau	0.00	0.00	0.00	0.00	0.06	0.06	0.24	0.25	0.07	0.08	1	1	70%	60%	0.02	0.02
GUY	Guyana	0.00	0.00	0.17	0.00	0.19	0.27	0.68	0.63	0.26	0.22	1	1	100%	83%	0.12	0.09
HND	Honduras	0.38	0.50	0.00	0.50	0.69	0.70	0.67	0.69	0.43	0.60	2	3	100%	100%	0.36	0.57
HKG	Hong Kong	0.38	0.56	0.17	0.17	0.35	0.38	0.60	0.59	0.37	0.42	2	2	97%	97%	0.30	0.37
HUN	Hungary	0.75	0.78	1.00	1.00	0.95	0.95	0.78	0.80	0.87	0.88	4	4	87%	87%	0.90	0.91
ISL	Iceland	0.50	0.72	0.33	0.33	0.67	0.67	0.69	0.66	0.55	0.60	3	3	97%	97%	0.50	0.57
IND	India	0.63	0.56	0.67	0.67	0.69	0.68	0.57	0.61	0.64	0.63	4	3	87%	97%	0.66	0.63
IDN	Indonesia	0.19	0.67	1.00	0.83	0.37	0.46	0.59	0.60	0.54	0.64	3	3	87%	90%	0.52	0.65
IRQ	Iraq	0.00	0.11	0.00	0.67	0.15	0.15	0.12	0.12	0.07	0.26	1	1	50%	60%	0.05	0.31
IRL	Ireland	0.75	0.78	0.50	0.50	0.97	0.98	0.61	0.62	0.71	0.72	4	4	100%	100%	0.74	0.75
ISR	Israel	0.56	0.56	0.33	0.33	0.68	0.78	0.72	0.64	0.57	0.58	3	3	100%	100%	0.53	0.55
ITA	Italy	0.44	0.61	0.83	0.83	0.85	0.92	0.68	0.67	0.70	0.76	4	4	100%	100%	0.71	0.79
JAM	Jamaica	0.25	0.33	0.50	0.50	0.66	0.81	0.75	0.70	0.54	0.58	3	3	100%	100%	0.47	0.55
JPN	Japan	0.88	0.89	0.33	0.33	0.17	0.24	0.62	0.64	0.50	0.53	3	3	70%	80%	0.46	0.49
JOR	Jordan	0.00	0.72	0.00	0.67	0.95	0.94	0.71	0.74	0.41	0.77	2	4	53%	100%	0.32	0.78
KAZ	Kazakhstan	0.56	0.67	0.33	0.67	0.23	0.85	0.38	0.55	0.38	0.68	2	4	83%	90%	0.38	0.73
KEN	Kenya	0.88	0.83	1.00	1.00	0.84	0.88	0.52	0.47	0.81	0.80	4	4	100%	90%	0.90	0.90
KIR	Kiribati	0.00	0.00	0.33	0.00	0.19	0.18	0.65	0.60	0.29	0.20	1	1	93%	97%	0.17	0.06
KOR	Korea (Republic of)	0.38	0.67	0.50	0.50	0.76	0.78	0.72	0.71	0.59	0.66	3	4	97%	97%	0.54	0.65
KOS	Kosovo (Republic of)	0.44	0.50	0.33	0.50	0.48	0.67	0.80	0.80	0.51	0.62	3	3	97%	100%	0.42	0.56
KGZ	Kyrgyz Republic	0.38	0.44	0.50	0.33	0.34	0.17	0.78	0.75	0.50	0.42	3	2	87%	90%	0.40	0.32
LAO	Lao People's Democratic Republic	0.56	0.11	0.67	0.67	0.31	0.31	0.57	0.76	0.53	0.46	3	2	63%	90%	0.51	0.36
LVA	Latvia	0.63	0.67	0.67	0.67	0.81	0.84	0.79	0.74	0.72	0.73	4	4	100%	100%	0.70	0.73

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		2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021
LBN	Lebanon	0.00	0.00	0.00	0.17	0.42	0.42	0.34	0.35	0.19	0.23	1	1	50%	67%	0.14	0.19
LSO	Lesotho	0.06	0.06	0.00	0.17	0.00	0.08	0.62	0.83	0.17	0.28	1	1	70%	100%	0.02	0.10
LBR	Liberia	0.06	0.28	0.33	0.50	0.04	0.10	0.72	0.61	0.29	0.37	1	2	90%	97%	0.14	0.29
LBY	Libya	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.12	0.03	0.03	1	1	50%	60%	0.00	0.00
LTU	Lithuania	0.69	0.89	0.83	0.83	0.85	0.86	0.80	0.77	0.79	0.84	4	4	100%	100%	0.79	0.86
LUX	Luxembourg	0.38	0.33	0.17	0.17	0.67	0.67	0.45	0.43	0.42	0.40	2	2	93%	93%	0.40	0.39
MDG	Madagascar	0.19	0.11	0.50	0.17	0.17	0.33	0.68	0.61	0.38	0.30	2	1	90%	90%	0.29	0.20
MWI	Malawi	0.19	0.39	0.33	0.33	0.26	0.32	0.62	0.49	0.35	0.38	2	2	97%	87%	0.26	0.35
MYS	Malaysia	0.75	0.78	0.33	0.33	0.60	0.65	0.63	0.62	0.58	0.60	3	3	97%	97%	0.56	0.59
MDV	Maldives	0.00	0.17	0.00	0.33	0.62	0.78	0.68	0.71	0.33	0.50	2	2	97%	100%	0.21	0.43
MLT	Malta	0.56	0.61	0.50	0.50	0.63	0.71	0.36	0.38	0.51	0.55	3	3	87%	90%	0.56	0.61
MHL	Marshall Islands	0.00	0.00	0.00	0.00	0.05	0.05	0.49	0.51	0.14	0.14	1	1	50%	90%	0.02	0.02
MUS	Mauritius	0.06	0.17	0.33	0.33	0.82	0.99	0.65	0.65	0.47	0.53	2	3	90%	100%	0.41	0.50
MEX	Mexico	0.63	0.78	0.83	0.83	0.74	0.79	0.52	0.63	0.68	0.76	4	4	97%	90%	0.73	0.80
FSM	Micronesia, Federated States of	0.00	0.00	0.00	0.00	0.20	0.20	0.44	0.47	0.16	0.17	1	1	53%	93%	0.07	0.07
MDA	Moldova	0.06	0.67	0.67	0.67	0.34	0.35	0.81	0.78	0.47	0.62	3	3	87%	90%	0.35	0.56
MNG	Mongolia	0.44	0.67	0.50	0.83	0.67	0.95	0.73	0.74	0.58	0.80	3	4	100%	100%	0.54	0.82
MNE	Montenegro	0.19	0.17	0.33	0.50	0.59	0.67	0.70	0.74	0.45	0.52	2	3	90%	100%	0.37	0.45
MSR	Montserrat	0.00	0.00	0.00	0.00	0.17	0.08	0.60	0.52	0.19	0.15	1	1	90%	80%	0.06	0.03
MAR	Morocco	0.31	0.56	0.33	0.17	0.84	0.80	0.70	0.68	0.55	0.55	3	3	100%	100%	0.50	0.51
MOZ	Mozambique	0.13	0.11	0.17	0.17	0.74	0.59	0.33	0.32	0.34	0.30	2	1	80%	90%	0.34	0.29
MMR	Myanmar	0.00	0.00	0.00	0.00	0.10	0.09	0.70	0.72	0.20	0.20	1	1	97%	63%	0.03	0.03
NAM	Namibia	0.00	0.00	0.00	0.17	0.32	0.53	0.62	0.54	0.24	0.31	1	1	97%	90%	0.11	0.23
NRU	Nauru	0.00	0.00	0.33	0.00	0.29	0.12	0.41	0.39	0.26	0.13	1	1	87%	80%	0.21	0.04
NPL	Nepal	0.00	0.39	0.00	0.33	0.84	0.84	0.50	0.52	0.34	0.52	2	2	53%	100%	0.28	0.52
NLD	Netherlands	0.69	0.67	0.67	0.67	0.84	0.83	0.86	0.79	0.76	0.74	4	4	100%	100%	0.73	0.72
NZL	New Zealand	0.63	0.56	0.67	0.67	0.95	0.98	0.67	0.58	0.73	0.69	4	4	93%	93%	0.75	0.73
NIC	Nicaragua	0.25	0.22	0.17	0.00	0.67	0.68	0.67	0.71	0.44	0.40	2	2	100%	97%	0.36	0.30
NER	Niger	0.81	0.39	0.50	0.83	0.00	0.01	0.56	0.68	0.47	0.48	3	2	100%	90%	0.44	0.41
NGA	Nigeria	0.56	0.39	0.17	0.50	0.20	0.44	0.65	0.62	0.40	0.49	2	2	93%	90%	0.31	0.44
NIU	Niue	0.00	0.00	0.00	0.00	0.17	0.17	0.68	0.70	0.21	0.22	1	1	50%	83%	0.06	0.06
NOR	Norway	0.81	0.78	0.67	0.67	0.87	0.88	0.82	0.73	0.79	0.76	4	4	100%	100%	0.78	0.77
PAK	Pakistan	0.13	0.44	0.33	0.67	0.50	0.63	0.53	0.54	0.37	0.57	2	3	97%	90%	0.32	0.58
PLW	Palau	0.00	0.00	0.00	0.00	0.09	0.08	0.52	0.53	0.15	0.15	1	1	53%	90%	0.03	0.03

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		2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021
PAN	Panama	0.13	0.33	0.17	0.50	0.61	0.77	0.50	0.50	0.35	0.53	2	3	87%	83%	0.30	0.53
PNG	Papua New Guinea	0.13	0.28	0.33	0.33	0.23	0.23	0.59	0.54	0.32	0.34	2	2	83%	87%	0.23	0.28
PRY	Paraguay	0.25	0.11	0.33	0.17	0.98	0.84	0.76	0.83	0.58	0.49	3	2	93%	100%	0.52	0.37
PER	Peru	0.69	0.72	0.67	0.67	0.93	0.95	0.71	0.71	0.75	0.76	4	4	100%	100%	0.76	0.78
PHL	Philippines	0.44	0.22	0.67	0.33	0.31	0.79	0.61	0.60	0.51	0.48	3	2	97%	97%	0.47	0.45
POL	Poland	0.56	0.94	0.50	0.83	0.82	0.82	0.70	0.69	0.65	0.82	4	4	100%	93%	0.63	0.87
PRT	Portugal	0.50	0.50	0.50	0.50	0.83	0.90	0.69	0.66	0.63	0.64	4	3	100%	100%	0.61	0.63
MKD	Republic of North Macedonia	0.00	0.06	0.83	0.33	0.71	0.72	0.69	0.68	0.56	0.45	3	2	93%	93%	0.51	0.37
SRP	Republika Srpska	0.25	0.39	0.17	0.17	0.09	0.19	0.13	0.14	0.16	0.22	1	1	63%	63%	0.17	0.25
ROU	Romania	0.38	0.33	0.17	0.50	0.76	0.74	0.58	0.60	0.47	0.54	3	3	87%	83%	0.43	0.53
RUS	Russian Federation	0.81	0.89	0.67	0.67	0.40	0.39	0.80	0.84	0.67	0.70	4	4	87%	83%	0.63	0.65
RWA	Rwanda	0.31	0.50	0.67	0.50	0.34	0.33	0.65	0.65	0.49	0.50	3	2	77%	87%	0.44	0.44
WSM	Samoa	0.50	0.11	0.67	0.67	0.19	0.11	0.47	0.52	0.46	0.35	2	2	73%	70%	0.45	0.29
STP	São Tomé and Príncipe	0.25	0.06	0.50	0.33	0.08	0.18	0.38	0.60	0.30	0.29	1	1	83%	83%	0.28	0.19
SAU	Saudi Arabia	0.50	0.22	0.17	0.17	0.69	0.71	0.69	0.63	0.51	0.43	3	2	97%	97%	0.45	0.37
SEN	Senegal	0.00	0.17	0.33	0.17	0.06	0.14	0.81	0.81	0.30	0.32	1	1	87%	70%	0.13	0.16
SRB	Serbia, Republic of	0.38	0.17	0.50	0.33	0.97	0.96	0.73	0.75	0.64	0.55	4	3	100%	97%	0.61	0.49
SYC	Seychelles	0.00	0.06	0.00	0.33	0.18	0.07	0.62	0.58	0.20	0.26	1	1	97%	100%	0.06	0.15
SLE	Sierra Leone	0.31	0.33	0.33	0.50	0.33	0.33	0.67	0.63	0.41	0.45	2	2	87%	87%	0.33	0.39
SGP	Singapore	1.00	0.89	0.50	0.50	0.93	0.98	0.59	0.62	0.75	0.75	4	4	97%	97%	0.81	0.79
SVK	Slovak Republic	0.50	0.50	0.50	0.50	0.86	0.86	0.57	0.52	0.61	0.60	3	3	97%	97%	0.62	0.62
SVN	Slovenia	0.75	0.78	0.83	0.83	0.69	0.71	0.84	0.79	0.78	0.78	4	4	97%	97%	0.76	0.77
SLB	Solomon Islands	0.31	0.11	0.33	0.00	0.29	0.27	0.55	0.63	0.37	0.25	2	1	77%	97%	0.31	0.13
ZAF	South Africa	0.56	0.50	0.17	1.00	0.82	0.81	0.50	0.46	0.51	0.69	3	4	100%	100%	0.52	0.77
ESP	Spain	0.75	0.72	0.67	0.83	1.00	1.00	0.62	0.63	0.76	0.80	4	4	97%	100%	0.80	0.85
LKA	Sri Lanka	0.00	0.00	0.00	0.00	0.41	0.41	0.56	0.58	0.24	0.25	1	1	50%	93%	0.14	0.14
VCT	St Vincent and the Grenadines	0.00	0.00	0.00	0.00	0.01	0.01	0.84	0.63	0.21	0.16	1	1	87%	87%	0.00	0.00
KNA	St. Kitts and Nevis	0.25	0.33	0.33	0.33	0.23	0.38	0.73	0.69	0.39	0.43	2	2	100%	100%	0.27	0.35
LCA	St. Lucia	0.13	0.00	0.17	0.17	0.20	0.24	0.85	0.60	0.34	0.25	2	1	100%	93%	0.16	0.13

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		2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021
SDN	Sudan	0.00	0.11	0.00	0.50	0.04	0.04	0.61	0.63	0.16	0.32	1	1	50%	97%	0.01	0.22
SUR	Suriname	0.00	0.22	0.50	0.17	0.12	0.20	0.63	0.66	0.31	0.31	2	1	70%	87%	0.21	0.20
SWE	Sweden	0.63	0.78	0.50	0.67	0.71	0.74	0.76	0.74	0.65	0.73	4	4	97%	97%	0.61	0.73
CHE	Switzerland	0.44	0.44	0.17	0.17	0.32	0.32	0.40	0.40	0.33	0.33	2	2	77%	80%	0.31	0.31
TWN	Taiwan	1.00	0.89	0.33	0.33	0.68	0.68	0.67	0.66	0.67	0.64	4	3	87%	97%	0.67	0.63
TJK	Tajikistan	0.56	0.50	0.67	0.67	0.68	0.67	0.76	0.75	0.67	0.65	4	3	100%	97%	0.64	0.61
THA	Thailand	0.75	0.78	0.00	0.17	0.59	0.80	0.71	0.67	0.51	0.61	3	3	100%	100%	0.45	0.58
TLS	Timor-Leste, Dem. Rep. Of	0.25	0.17	0.17	0.17	0.17	0.25	0.69	0.60	0.32	0.30	2	1	67%	87%	0.19	0.19
TGO	Togo	0.63	0.33	0.33	0.50	0.48	0.34	0.78	0.68	0.56	0.46	3	2	87%	90%	0.48	0.39
TON	Tonga	0.00	0.00	0.33	0.67	0.19	0.09	0.63	0.62	0.29	0.34	1	2	100%	87%	0.17	0.25
TTO	Trinidad and Tobago	0.50	0.44	0.33	0.17	0.84	0.82	0.65	0.61	0.58	0.51	3	2	90%	93%	0.56	0.48
TUR	Türkiye, Republic of	0.38	0.61	0.50	0.83	0.82	0.82	0.71	0.69	0.60	0.74	3	4	100%	100%	0.56	0.76
TCA	Turks and Caicos Islands	0.00	0.00	0.00	0.33	0.32	0.32	0.71	0.73	0.26	0.35	1	2	83%	87%	0.11	0.22
TUV	Tuvalu	0.00	0.00	0.00	0.00	0.08	0.08	0.51	0.53	0.15	0.15	1	1	50%	97%	0.03	0.03
UGA	Uganda	0.69	0.28	0.33	0.33	0.88	1.00	0.61	0.69	0.63	0.58	4	3	100%	100%	0.63	0.54
UKR	Ukraine	0.13	0.78	0.17	0.50	0.83	0.80	0.76	0.78	0.47	0.72	3	4	93%	100%	0.37	0.69
USA	United States	0.69	0.72	0.33	0.33	0.58	0.59	0.60	0.57	0.55	0.55	3	3	93%	93%	0.53	0.55
GBR	United Kingdom	0.88	0.78	0.67	0.67	0.83	0.85	0.64	0.60	0.75	0.72	4	4	93%	93%	0.79	0.76
URY	Uruguay	0.75	0.67	0.50	0.50	0.83	0.77	0.62	0.61	0.67	0.64	4	3	97%	100%	0.69	0.65
UZB	Uzbekistan	0.69	0.61	0.83	0.83	0.73	0.87	0.72	0.72	0.74	0.76	4	4	100%	97%	0.75	0.77
VUT	Vanuatu	0.00	0.22	0.00	0.50	0.00	0.00	0.57	0.58	0.14	0.33	1	2	53%	77%	0.00	0.24
VNM	Vietnam	0.13	0.72	0.17	0.67	0.59	0.59	0.65	0.65	0.38	0.66	2	3	83%	93%	0.29	0.66
ZMB	Zambia	0.38	0.56	0.67	0.83	0.83	0.80	0.67	0.62	0.63	0.70	4	4	80%	97%	0.62	0.73
ZWE	Zimbabwe	0.00	0.00	0.67	0.50	0.79	0.92	0.72	0.68	0.54	0.53	3	3	100%	93%	0.48	0.47

Source: Authors' elaboration based on ISORA 2022 Survey.



Working Papers *Serie*



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