Box 9.2. Difficulties and challenges in using the "cost of collection" ratio as an indicator of efficiency and/or effectiveness

Observed over time, a downward trend in the "cost of collection" ratio can appear to constitute evidence of a reduction in relative costs (i.e., improved efficiency) and/or improved tax compliance (i.e., improved effectiveness). However, experience has also shown that there are many factors that can influence the ratio which are **not** related to changes in a tax administrations' efficiency and/or effectiveness and which render this statistic highly unreliable in the international context:

- **Changes in tax policy**: Tax policy changes are an important factor in determining the cost/revenue relationship. In theory, a policy decision to increase the overall tax burden should, all other things being equal, improve the ratio by a corresponding amount, but this has nothing to do with improved operational efficiency or effectiveness.

- **Macroeconomic changes**: Significant changes in rates of economic growth etc. or inflation over time are likely to impact on the overall revenue collected by the tax administration and the cost/revenue relationship.

- **Abnormal expenditure of the tax administration**: From time to time, a tax administration may be required to undertake an abnormal level of investment (for example, the building of a new information technology infrastructure or the acquisition of more expensive new accommodation). Such investments are likely to increase overall operating costs over the medium term, and short of offsetting efficiencies which may take longer to realise, will impact on the cost/ revenue relationship.

- **Changes in the scope of revenues collected**: From time to time, governments decide to shift responsibility for the collection of particular revenues from one agency to another which may impact the cost/revenue relationship.

From a fully domestic perspective, an administration may be able to account for those factors by making corresponding adjustments to its cost or collected revenue. This can make tracking the "cost of collection" ratio a helpful measure to see the trend over time of the administration's work to collect revenue. If it were gathered by tax type, it may also help inform policy choices around how particular taxes may be administered and collected.

However, its usefulness with respect to international comparison is very limited. While administrations may be able to account for the above factors from a domestic perspective, it will be difficult to do this at an international level as such analysis would have to consider:

- **Differences in tax rates and structure**: Rates of tax and the actual structure of taxes will all have a bearing on aggregate revenue and, to a lesser extent, cost considerations. For example, comparisons of the ratio involving high-tax jurisdictions and low-tax jurisdictions are hardly realistic given their widely varying tax burdens.

- **Differences in the range and nature of revenues administered**: There are a number of differences that can arise here. In some jurisdictions, more than one major tax authority may operate at the national level, or taxes at the federal level may be predominantly of a direct tax nature, while indirect taxes may be administered largely by separate regional/state authorities. In other jurisdictions, one national authority will collect taxes for all levels of government, i.e., federal, regional and local governments. Similar issues arise in relation to the collection of social insurance contributions.

- **Differences in the range of functions undertaken**: The range of functions undertaken by tax administrations can vary from jurisdiction to jurisdiction. For example, in some jurisdictions the tax administration is also responsible for carrying out activities not directly related to tax

administration (for example, the administration of certain welfare benefits or national population registers), while in others some tax-related functions are not carried out by the tax administration (for example, the enforcement of debt collections). Further, differences in societal views may influence what an administration does, how it can operate and what services is has to offer. The latter may have a particularly significant impact on the cost/revenue relationship.

Finally, it should be pointed out that the "cost of collection" ratio ignores the revenue potential of a tax system, i.e., the difference between the amount of tax actually collected and the maximum potential revenue. This is particularly relevant in the context of international comparisons – administrations with similar cost/revenue ratios can be some distance apart in terms of their relative effectiveness.

Information and communication technology

On average ICT expenditure accounts for about 11% of operating expenditure. However, reported levels of ICT expenditure vary enormously between administrations. For those administrations able to provide ICT-related cost, around 50% reported an annual operating ICT expenditure exceeding 10% of the administration's total operating expenditure in 2021 and another 20% reported figures between 5% and 10% (see Table D.6). While some of this variation can be explained by the different sourcing and business approaches, some cannot and point, at least on the surface, to expenditure levels that maybe somewhat below the support needed to provide the rapidly changing electronic and digital services administrations are increasingly being called upon to deliver. In parallel to this, administrations report that they are investing more in their cybersecurity practices, which are needed to protect the integrity of their system and maintain taxpayer trust. Box 9.3. and Chapter 10 on digital transformation highlight some of the practices in this field.

Box 9.3. Examples – Investment in cyber security

Australia – System integrity measures against cybercrime

One of the Australian Taxation Office's (ATO's) innovations to fight cybercrime is the implementation of the new System Integrity Program and its Vulnerability Assessment Methodology. This contemporary methodology seeks to understand weaknesses in existing business processes and user pathways, and test the exposure to external fraud and cybercrime threats across the end-to-end tax and superannuation ecosystem. The method allows the ATO to consider where additional countermeasures may be needed to prevent cybercrime and external fraud occurring from a whole-of-system perspective.

See Annex 9.A. for supporting material.

Mexico – Innovations in the fight against tax cybercrime

Event correlation is using analytics to identify and understand patterns in historical and online data to better locate and mitigate potential security threats. Its main objective is to identify anomalous behaviours and support the establishment of responsibilities in registered actions, using the activity audit trails generated by network connections, browsing history, user accounts, among others.

SAT uses a specialized system for the collection and analysis of information systems records (SIEM) as well as specialised infrastructure for the analysis of the information contained in the SIEM. In addition, staff are trained in the use of analysis tools and the investigation of information systems records Current legislation must be constantly reviewed in terms of information retention periods. In addition, attention must be paid to preserving the integrity of the logs, developing event correlation rules to generate alerts to those responsible for them and monitoring, updating and retraining of analytical models.

Sources: Australia (2023) and Mexico (2023).

As regards the operational ICT solutions (i.e., solutions that are used to fulfil the tax administration's mandate and include systems for registration, return processing, payment processing and auditing), almost all tax administrations report using custom built ICT solutions, while 55% report also using commercial-off-the-shelf (COTS) solutions (see Figure 9.3.).

Figure 9.3. Basis of ICT solutions of tax administrations, 2021

Percent of administrations that have such solutions
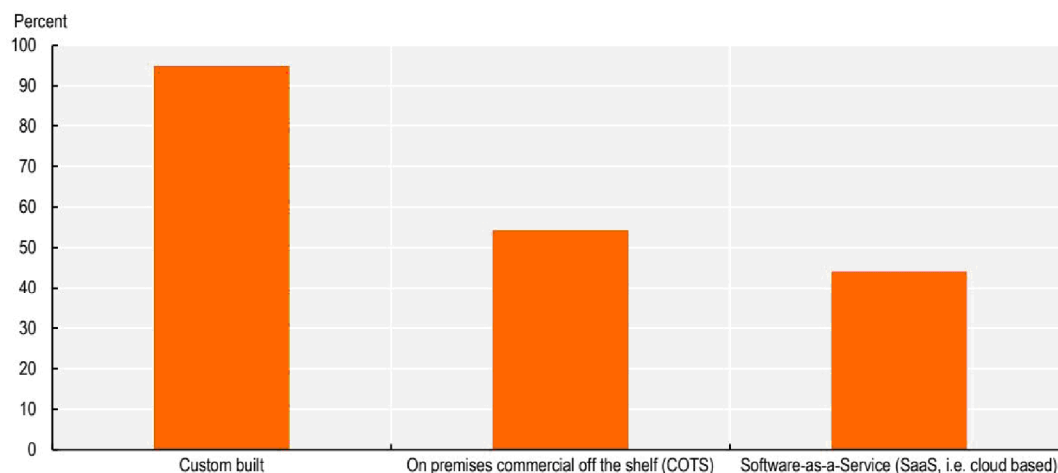

Source: Table A.21.

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In addition, around 45% of the administrations report using software-as-a-service (SaaS) solutions. These are software licensing models where the tax administration pays for a subscription license and the cost depends on the usage. The software is installed on third party computers, not on tax administration computers, and is accessed by users via the internet. One of the main barriers to adopting SaaS more widely, is the storage of sensitive tax data on these third-party systems. As more legislative and technological solutions are identified, including regarding the encryption of data, it is possible the use of SaaS will increase.

Workforce

In 2021, the administrations included in this report employed approximately 1.7 million staff (see Table A.18.) making the effective and efficient management of the workforce critical to good tax administration. Having a competent, professional, productive and adaptable workforce is at the heart of most administrations' human resource planning. With salary costs averaging more than 70% of operating expenditures, any significant budget change invariably impacts staff numbers. The "double pressure" created from reduced budgets and technology change, mentioned in the 2017 edition (OECD, 2017[2]) (see also Figure 9.4.), continues to be a significant management issue for most administrations. The challenge is compounded for some administrations which, due to contract restrictions or government mandates, may find it difficult to strategically down-size their operations other than through the non-replacement of staff who leave of their own accord.

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Figure 9.4. Double pressure on the workforce

Figure 9.4. Double pressure on the workforce
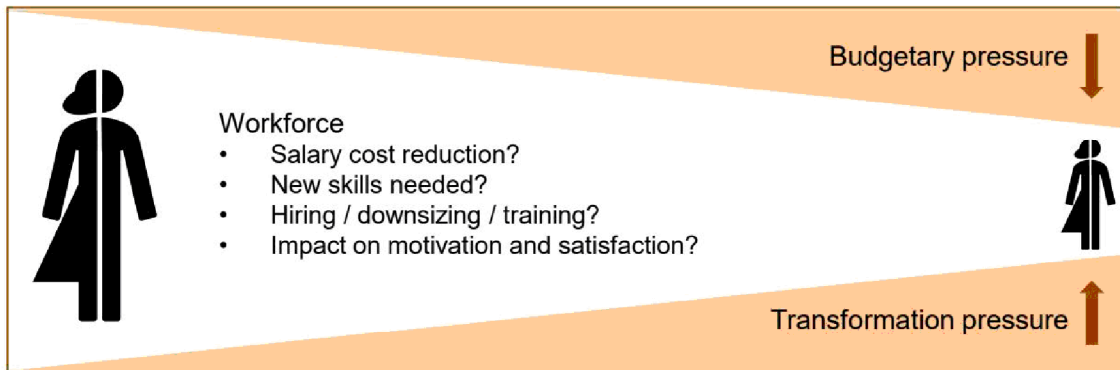
Staff usage by function

Figure 9.5. provides average allocation of staff resources (expressed in full-time equivalents) across four functional groupings used to categorise tax administration operations.[1] While the detailed data for each administration in Table D.8. shows a significant spread of values and a number of outliers for each function, on average the "audit, investigation and other verification" function and the "registration, services, returns and payment processing" function are equally resource intensive, each employing on average thirty percent of staff. Both ratios have remained stable over recent years.

Figure 9.5. Staff usage by function, 2021
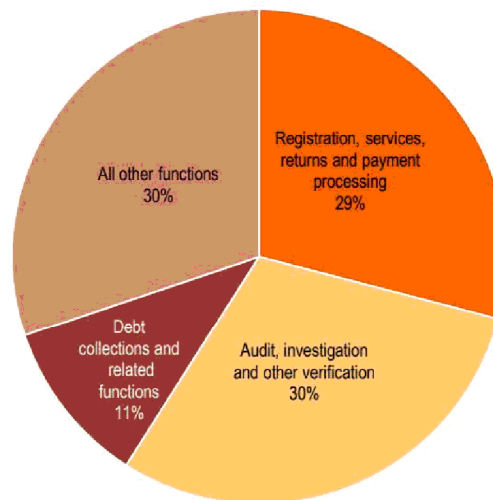
Note: Excluding administrations that were unable to provide the break-down for all functions.
Source: Table D.8.

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Staff metrics

ISORA 2022 also gathered key data concerning the age profiles, length of service, gender distribution and educational qualifications of tax administration staff: see Tables D.10. to D.15. and A.24. to A.31. In interpreting this data there are two main considerations to bear in mind:

- Combined tax and customs administrations were allowed to use their total workforce for answering the underlying survey questions as it may be difficult for them to separate the characteristics of the tax and customs workforce.
- Since ISORA 2020, staff metrics information is collected for the total number of staff, whereas in previous ISORA rounds (i.e., ISORA 2016 and 2018) staff metrics information was collected for permanent staff only. Trend analysis comparing staff metrics across the different ISORA surveys should therefore be conducted with caution. In particular for administrations that employ a significant number of non-permanent staff, this change in methodology may cause a shift in staff-metric-percentages that is not based on regular staff fluctuations but rather a result of including a different group of staff.

Age profiles

While there are significant variations between the age profiles of tax administration staff (see Tables D.11. and D.12.), it is interesting to see that there are also differences when viewed across different regional groupings. This may be the result of a complex mix of cultural, economic, and sociological factors (for example, economic maturity, recruitment, remuneration, and retirement policies).

Figure 9.6. illustrates that staff are generally younger in administrations in the regional groupings of "Asia-Pacific" and "Middle East and Africa" where, on average, around thirty percent of staff are below 35 years of age, whereas in the "Americas" and "Europe" this percentage drops to below twenty percent. At the same time, administrations in the "Americas" and "Europe" have a large percentage of staff older than 54 years.
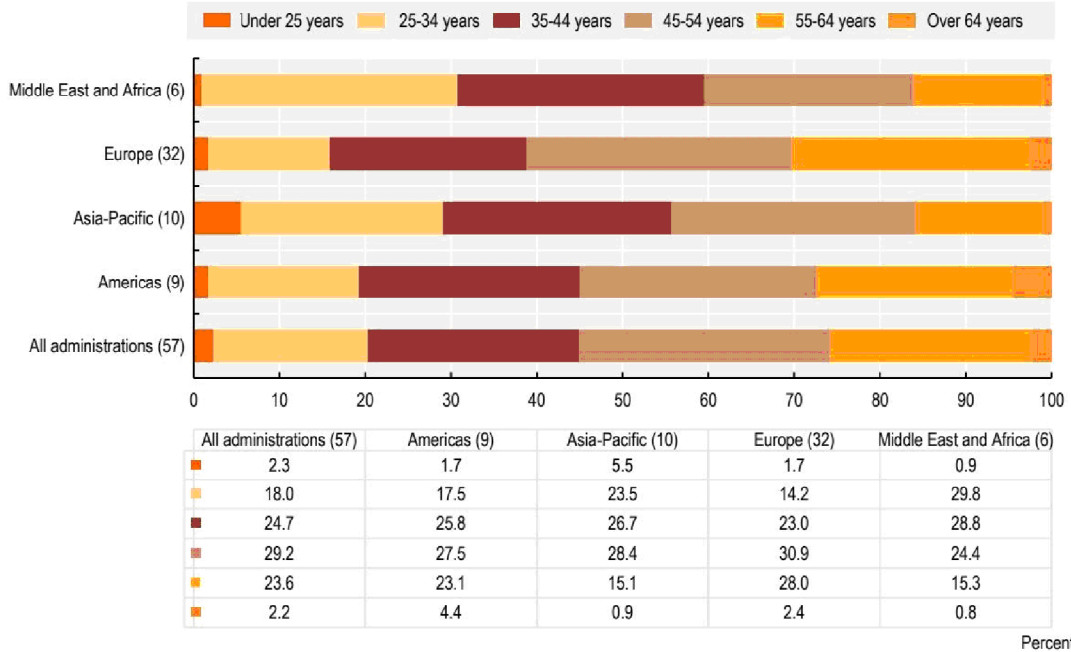
Looking at the jurisdiction specific data, the percentage of staff older than 54 years grew in two-thirds of administrations over the period 2018 to 2021 (see Figure 9.7.).

Length of service

The difference in age profiles is also largely reflected in the length of service of tax administration staff. Figure 9.8. indicates that a significant number of administrations will not only face a large number of staff retiring over the next years, but that many of these staff will be very experienced, thus raising further issues about retention of key knowledge and experience.

Figure 9.6. Age profiles of tax administration staff, 2021

Percentage of staff by age bands for selected regional groupings

| | Under 25 years | 25-34 years | 35-44 years | 45-54 years | 55-64 years | Over 64 years |

|	All administrations (57)	Americas (9)	Asia-Pacific (10)	Europe (32)	Middle East and Africa (6)
	2.3	1.7	5.5	1.7	0.9
	18.0	17.5	23.5	14.2	29.8
	24.7	25.8	26.7	23.0	28.8
	29.2	27.5	28.4	30.9	24.4
	23.6	23.1	15.1	28.0	15.3
	2.2	4.4	0.9	2.4	0.8

Percent

Note: The following administrations are included in the regional groupings: Americas (9) – Argentina, Brazil, Canada, Chile, Colombia, Costa Rica, Mexico, Peru and the United States; Asia-Pacific (9) – Australia, China (People's Republic of), Hong Kong (China), Indonesia, Korea, Malaysia, New Zealand, Singapore and Thailand; Europe (32) – Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland and the United Kingdom; Middle East and Africa (6): Israel, Kenya, Morocco, Saudi Arabia, South Africa and Türkiye.
Source: Table D.12.

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## Figure 9.7. Staff older than 54 years: Movement between 2018 and 2021
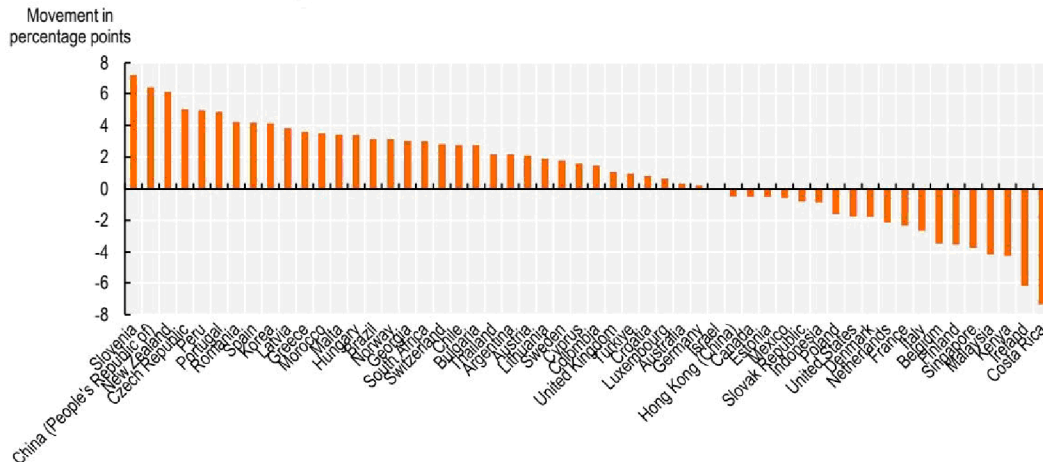
Note: Only includes jurisdictions for which data was available for both years. Data for Iceland and Saudi Arabia has been excluded due to the mergers of the tax administration with the customs administration.
Source: Table D.12.

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## Figure 9.8. Average length of service vs. average age profile, 2021
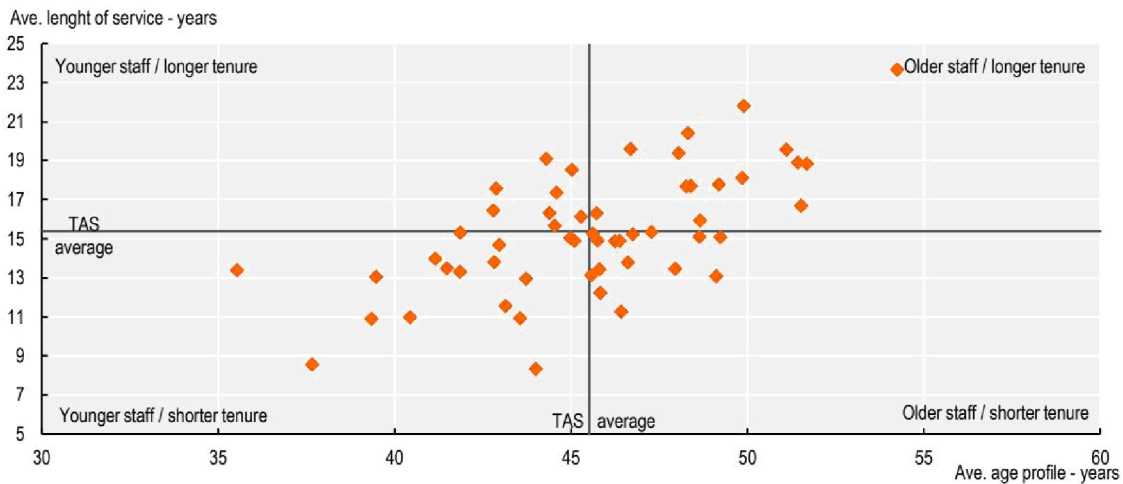
Source: OECD Secretariat calculations based on Tables D.11 to D.14.

Gender distribution

In light of the strong public interest in gender equality, administrations were invited to report total staff and executive staff respectively by gender. As can be seen in Figure 9.9., while many administrations are close to the proportional line, typically female staff remains proportionally underrepresented in executive positions and significantly underrepresented in a number of administrations, something that has remained unchanged since the 2017 edition of this report (OECD, 2017[2]).

Figure 9.9. Percentage of female staff – total female staff vs. female executives, 2021
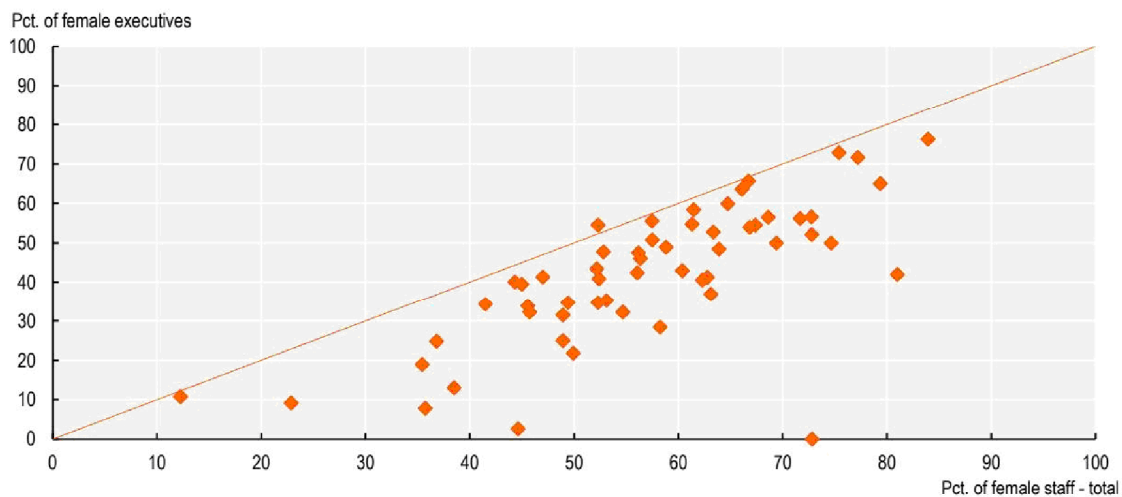
Source: Table D.15.

Looking at the overall averages, whilst there are variations between jurisdictions (see Table D.15.), on average the share of female employees of total staff and executive staff has remained largely unchanged since 2018, with a very small increase of around 4 percent of female executives (see Table 9.3.). The jurisdiction-level data shows that in about two-thirds of administrations the percentage of female executives has increased since 2018 (see Table D.15.).

Table 9.3. Evolution of share of female staff and female executives (in percent)

Staff category	2018	2019	2020	2021	Change between 2018 and 2021 in percent
Female staff (56 jurisdictions)	56.9	57.6	57.5	57.6	+1.2
Female executives (55 jurisdictions)	40.2	41.9	41.6	42.6	+4.2

Note: The table shows the share of female employees of total staff and executive staff for those jurisdictions that were able to provide the information for the years 2018 to 2021. The number of jurisdictions for which data was available is shown in parenthesis.
Source: Table D.15.

The ISORA survey also asked administrations to indicate whether staff has self-identified as neither female nor male (referred to as "other" gender for the purposes of the survey). Table A.31. shows that two administrations, Australia and New Zealand, reported having staff who self-identified as "other".

Staff attrition

Staff attrition, also called staff turnover, refers to the rate at which employees leave an organisation during a defined period (normally a year). High attrition rates may result from a variety of factors, such as downsizing policies, demographics or changing staff preferences. The attrition rate should be considered together with other measures, such as the hire rate, which looks at the number of staff recruited during a defined period, when evaluating the human resource trends of an administration.

While a high attrition rate combined with a low hire rate is usually associated with a general downsizing policy – and may therefore be accepted – administrations should be concerned where both rates are high. Recruitment is costly, not only the recruitment process itself but also the cost and time for training and supporting new staff members, and the significant down time before new staff are fully operational or able to perform at the highest level. Having high attrition rates are generally to be avoided.

Having attrition rates that are too low may also not be ideal. While an organisation is growing, a low attrition rate may be accepted. However, in situations where both the attrition rate and the hire rate are low, an organisation may not have the ability to recruit new skills as all positions are filled. This could be an issue particularly for administrations that are undergoing transformation and therefore are in need of staff with skills that are different from what is currently available within the administration.

While what is considered a "healthy" attrition rate differs between industry sectors or jurisdictions, the average attrition rate for administrations participating in this publication of 6.8% in 2021 and the average hire rate of 5.9% in 2021 would seem to present a reasonable range for tax administrations of between 5% and 10%. It is worth noting that the average hire rate for 2021 continues to be below those reported in 2018 and 2019, which may be a pandemic related impact. At the same time, the average attrition rate for 2021 is now back to pre-pandemic levels. (See Table 9.3.)

Table 9.4. Evolution of attrition and hire rates (in percent)

	2018	2019	2020	2021	Change between 2018 and 2020 in percent
Attrition rates (50 jurisdictions)	6.6	7.1	6.0	6.8	+2.8
Hire rates (50 jurisdictions)	6.8	7.0	5.8	5.9	-11.9

Note: The table shows the average attrition and hire rates for those jurisdictions that were able to provide the information for the years 2018 to 2021. The number of jurisdictions for which data was available is shown in parenthesis. Data for China (People's Republic of), Iceland, Norway and Saudi Arabia were excluded from the calculation as the result of extraordinary staff transfers over the period 2018 to 2021 which were recorded as recruitments, thus distorting their averages for those years (see notes in Table A.23).
Source: Table D.9.

However, when looking at specific administration data, it becomes apparent that "attrition and hire" rates cover a very broad range. Figure 9.10. shows the relationship between tax administration attrition and hire rates. It illustrates that there are a number of administrations with attrition and hire rates well above 10% (upper-right box), while others show very low attrition and hire rates (lower-left box).

Figure 9.10. Attrition and hire rates, 2021
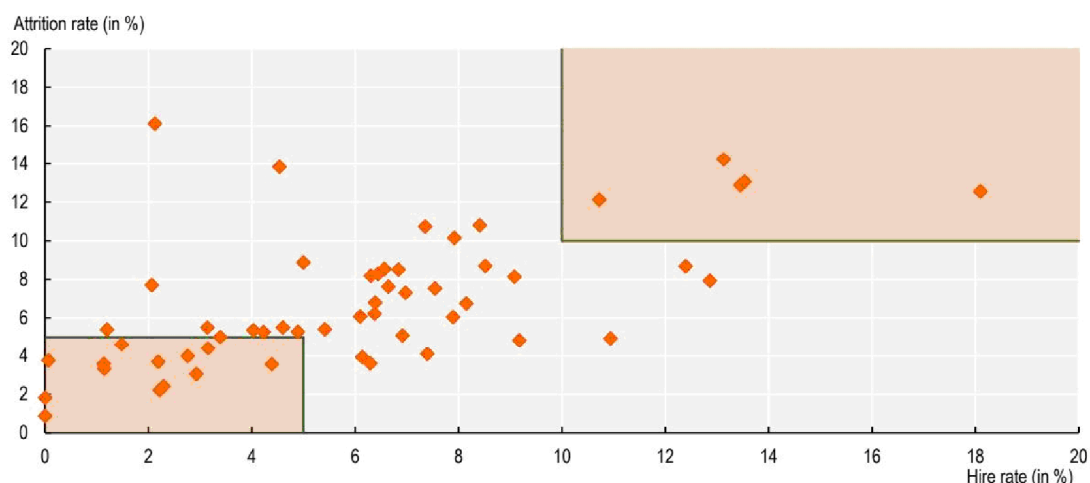
Note: Attrition rate = number of staff departures/average staffing level. Hire rate = number of staff recruitments/ average staffing level. The average staffing level equals opening staff numbers + end-of-year staff numbers/2.
Source: Table D.9.

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Whilst recruitment rates may vary by year, the challenge of training and knowledge transfer are constant. The COVID-19 pandemic brought these issues into sharp focus as HR processes that previously relied on face-to-face contact, had to be conducted remotely. Tax administrations report that these practices brought significant benefits to the administration and candidates, and as a result they are now being adapted for the longer term. Box 9.4. illustrates some of the innovative approaches being used both to attract candidates to the tax administration and to also digitise those processes.

> ## Box 9.4. Examples – Enhancing HR processes
>
> ### France – Changing recruitment processes
>
> The French tax administration (DGFiP) has significant recruitment needs to meet the demands of its various departments and to compensate for retirements. In 2022, it has recruited more than 3 700 new employees, two-thirds of whom were hired through competitive examinations and one-third through contractual arrangements.
>
> Recruitment by contract is on the rise, which means that in a context of tension on the labour market, recruitment techniques must be optimised to increase the pool of candidates and the diversity of profiles. In this context, the DGFiP is experimenting with innovative tools such as sourcing and pre-recruitment:
>
> - Sourcing, based on criteria defined upstream, analyses the data present on the many professional platforms, job sites, CV libraries, and other social networks. This method makes it possible to detect the profiles that best meet expectations. The results produced by these algorithms combine both the quantity and quality of the selected profiles.
> - Once the pool has been constituted, the recruitment phase begins. In order to better assess the aptitudes, interpersonal skills and reasoning of candidates, new IT solutions make it possible to create an evaluation process centred on the candidates, inviting them to complete a circuit composed of a series of mini-games assessing different cognitive skills. This playful, innovative and original method also ensures a more attractive image for the DGFiP employer brand.
>
> The use of these new tools will make it possible to transform the recruitment method by going beyond the classic analysis of the curriculum vitae. It will reveal the true potential of candidates while ensuring a fairer and more diversified recruitment.
>
> ### Japan – Recruitment of digital talent and human capital support
>
> In June 2021, the National Tax Agency (NTA) published its 'Digital Transformation of Tax Administration - Future Vision of Tax Administration 2.0' which sets out how to improve tax administration by exploiting the advantages of digital technology.
>
> For this to be successful, it is crucial to recruit and retain people from science and engineering backgrounds who are considered to have a background in information and communication technology. Accordingly, from fiscal year 2023 onwards, the NTA has created a new entry examination category with subjects such as mathematics and computer science, which are more familiar to students in science and engineering fields.
>
> The NTA has also focused on developing human resources through a training system based on data literacy with levels from Entry to Expert that allows staff to build their knowledge in this crucial field. At the Expert level staff have sophisticated expertise in statistical science and machine learning, and the development of a predictive models.
>
> See Annex 9.A. for more information.
>
> ### Latvia – Digitisation of recruitment processes
>
> Job advertisements posted on the State Employment Agency portal automatically migrate to the State Revenue Service portal vacancies section, indicating the place of work (in person, partially remotely, or completely remotely).

After evaluation of applications, candidates are forwarded to the next round for a remote test. On the day of the test, a test task or a link to the platform is sent to the applicant's e-mail. Candidates are also invited to participate in a remote interview via video call.

Successful candidates are informed digitally, and the subsequent induction and training takes place both remotely and in person, depending on the specifics of the job.

Sources: France (2023), Japan (2023) and Latvia (2023).

Supporting staff

The changes tax administrations are managing, whether technology, policy or budget driven, are constant. In addition, the wider digital transformation of the economy is changing the service expectations of taxpayers, and staff need the right tools and support to adapt. As a result, tax administrations are considering the best way to support staff through these changes, as well as ensuring they have the right tools for the tasks.

Tax administrations are also reporting that they are investing in services that can help 'frontline' staff better understand taxpayer needs and provide better services to them. This can cover a range of channels from call centres through to social media. These investments are allowing tax administrations to provide improved services, and their staff feel better equipped to deliver those high-quality services. Tax administrations also report that sophisticated analytics are being used to match staff skills to taxpayer needs. Box 9.5. highlights how France is using the sizeable amount of data it has on staff to build management tools that give insight into the staff profiles and where development gaps exist.

Box 9.5. France – HR data lake

The DGFiP has more than 97 000 employees, spread across over a 100 local divisions and several hundreds of physical locations. It has set up a data lake into which all of its data will be stored. This will include all data concerning human resources (HR), in order to stimulate their use through data visualisation tools.

In the future, all the data stored in the various HR-related applications will be put into the data lake, whether the data concerns personal information about employees, their career path, including outside the DGFiP or their vocational training. Data related to DGFiP's recruitment efforts will also be included. It will therefore become possible to run data analysis on all of this information, which until now is stored and processed separately, and to ensure, for instance, a better knowledge and understanding of the employees' profile.

Already, thanks to the pooling of data and using the possibilities offered by data visualisation, the DGFiP is building a dashboard designed to facilitate the management of human resources. The dashboard presents a large number of indicators in a lively and interactive manner. Indicators belong to 6 categories: headcount, vocational training, working time, health and safety, recruitment, and equality and diversity. Offering up-to-date and easy-to-use information, the dashboard is a very useful management tool. Most of the indicators offer a national view with a depth of several years, which makes it possible to identify trends and even structural changes. In addition, the tool offers the possibility to quickly make comparisons between local directorates and reveal possible disparities between territories.

Source: France (2023).

Anecdotal evidence, gathered through numerous Forum on Tax Administration (FTA) meetings, shows that tax administrations put considerable efforts into supporting staff during periods of transition, considering issues such as:

- **Staff welfare**, which includes looking into staff motivation and satisfaction, health and safety related issues, work-life balance, assistance programmes, and ergonomic office equipment; and

- **Staff training**, which includes how to best support those that have been given new tasks, those that have to perform their tasks from home instead of the office, as well as those that are leading partially or wholly virtual teams for the first time.

Technology is also providing new opportunities to analyse existing processes to look for efficiencies, including through the use of artificial intelligence, machine learning and robotic process automation (RPA) to automate some of the core tasks within a tax administration. Box 9.6. illustrates the wide range of uses that automation is being put to.

Table 6.1. in Chapter 6 highlights the rapid growth in the use of such services with for example, more than 50% of administrations reporting that they now using or planning to use RPA. (See also Figure 9.11. for the up-take of RPA by tax administrations over the years.) This is helping tax administrations respond to budgetary and workforce pressures as it is freeing up resource for staff to be focussed on more complex tasks.

Figure 9.11. Evolution of the implementation and use of Robotic Process Automation, 2018 to 2021

Percent of administrations
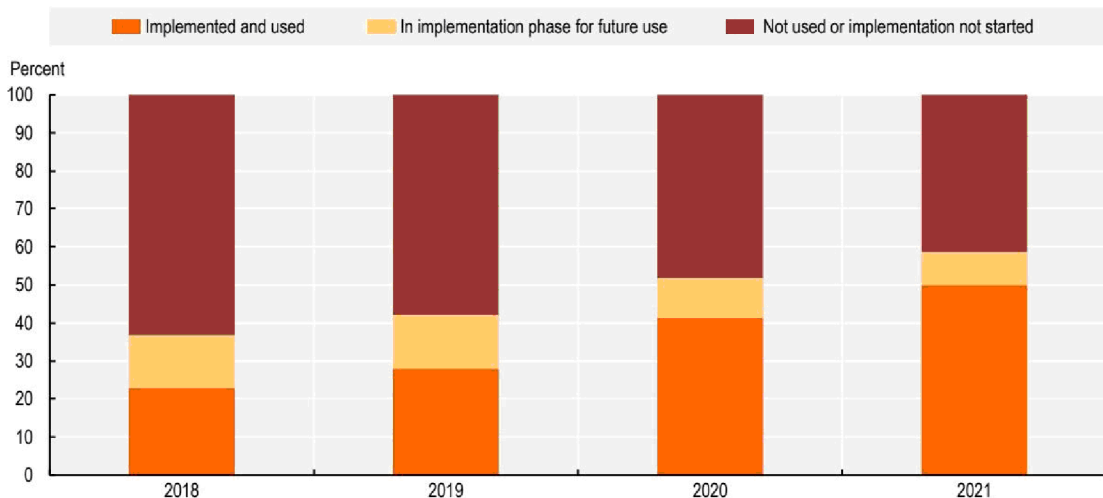
Source: Table A.92.

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Box 9.6. Examples – Automation in tax administration

Argentina – Digital single file

Under this project the Argentinian tax administration (AFIP) will have a single digital file of all the documentation submitted by taxpayers, meaning that once submitted it can be used across a wide range of areas and procedures.

This means that if, for example, a taxpayer files a title deed digitally, the document will not have to be submitted again in the future and it can be used for other procedures such as for a tax audit, or an application for a fiscal benefit.

This saves the taxpayer time and money as the document will not have to be certified again and removes the need for AFIP to store the same document in multiple units.

Canada – Digital Document Management Program

In May 2022, the Digital Document Management Program (DDMP) was established to enable the Canada Revenue Agency (CRA) to transition from internal paper-based processes and to enhance its existing digital processes. Despite the shift towards digital services, there continues to be a high volume of paper mail received by the CRA. The intent of the DDMP is to reduce the overwhelming burden of incoming high volume paper mail by converting incoming documents from taxpayers into a digital format.

The DDMP offers five standardised capabilities to onboarded programmes. It operates in partnership with an external contracted Managed Service Provider (MSP) to which mail is re-directed and prepped for imaging. Images are digitised and uploaded into a digital document repository, where internal CRA users can virtually view documents and access workloads. These documents are well defined, catalogued and easily accessible so that users can view and share information within a timely fashion. Data from each in-scope document can also be extracted by the MSP and delivered to the CRA, ready to be incorporated into the CRA systems. The repository can also store digitised documents received through the CRA's Submit Docs channel, which solicits and receives digital copies of records from taxpayers and can also receive eFax submissions from various sources.

France – Automation in VAT refunds

A digital assistant is software that allows the automation of certain actions (typing, clicks, etc.) and that interacts as an agent would through a screen and a mouse. This automation of processes by robotics reproduces the tasks that agents perform routinely. It is suited to repetitive tasks that do not require complex intellectual analysis and are particularly time consuming.

The French tax administration has developed several digital assistants, including one that compares daily lists of beneficiaries of VAT credit refunds about to be issued with lists of collection orders for which the deadline for a payment date has passed, in order to identify VAT credit refunds that may be subject to administrative attachment.

Currently, the digital assistant is used for so-called non-fiscal debts (for example, penalties issued by various administrative bodies that the tax administration is responsible for collecting) but its extension to fiscal debts is being considered.

On average, it takes about 6 months and costs approximately EUR 400 000 to develop a digital assistant, making it a cost effective tool. Operating a digital assistant also brings many benefits which makes it an even more attractive solution:

- A lighter and smoother workload for staff, who can refocus on higher value-added activities.
- Shorter processing times.
- Increased traceability and reliability.
- Lower material costs (toners, paper, storage, postage, etc.).
- Harmonisation of practices and increased cross-services co-operation.
- Optimised management of activity through the automated production of statistics and reports.

Ireland – Automation in software quality assurance and software deployment

As Revenue continues to enhance its IT services, it also enhances its software development and software quality assurance approaches. Traditional end of project testing is no longer suitable for the timely release cycles, especially in large and intricate systems. Building on the initial benefits from the use of electronic "record-and-playback" style repetition of manual tests, predominately for regression and end of cycle testing, Revenue has expanded its automation test capability to implement continuous API and functionality testing that would not otherwise be feasible.

Revenue has embedded test automation as a key enabler of its "shift left" approach which enables testing earlier in the cycle, improves the feedback loop to developers, reduces system delivery times, increases automated test coverage and improves software quality. By implementing the "shift left" ideology and agile approaches, Revenue is successfully using test automation to facilitate a broader range of concurrent and continuous testing to reduce delivery time and improve software quality assurance.

Mexico – Automation in the processing and management of incoming service requests

SAT has made investments in systems capable of processing complaints and emails, that utilise automated classification based on keywords. This technological advancement plays a crucial role in fulfilling the administration's core objectives of promoting voluntary, accurate and timely compliance. This system establishes mechanisms that facilitate voluntary compliance, providing taxpayers with tools that make the process easy while ensuring close monitoring.

By enhancing the complaint and investigation process, the system enables prompt follow-up on potential acts of corruption. This sends a strong message to taxpayers that their grievances are taken seriously, as they are quickly identified by the system. Moreover, it streamlines the efficient processing of service requests by swiftly directing them to the appropriate department within the institution. Consequently, this system significantly contributes to improving the public's perception of SAT.

Sources: Argentina (2023), Canada (2023), France (2023), Ireland (2023) and Mexico (2023).

Developing staff capability

While ISORA 2022 did not survey administrations as regards their strategy and approaches towards increasing staff capability, this remains a key topic for all administrations. This report highlights many areas of change that are taking place within administrations, and effective change relies on the capabilities of staff being developed. This is particularly important with digital transformation, as this frequently requires new skill sets. (See Chapter 10 for a more detailed discussion on this.)

In parallel, tax administrations report moving their training programmes into a virtual environment as shown in previous editions of this report, for example, using live online training sessions or pre-recorded videos/webinars (OECD, 2021[3]). While moving to a virtual training environment may have some up-front costs, it may save costs in the longer term as once produced, pre-recorded training material can be viewed at any time, from anywhere. Remote training can reduce travel expenses and can allow staff to learn at their own pace and convenience as well as increasing the number of staff members that can follow a course. New technologies are also helping facilitate the collaborative learning aspects, increasing the quality of the training experience. The latest approaches taken by the French tax administration are described in Box 9.7.

Box 9.7. France – E-learning solutions

In the DGFiP, improving staff skills increasingly relies on the development of e-learning solutions. The "mechanics" of e-learning obliges learners to be involved in their training journey and to measure how much the educational message has been understood. This has led to the four solutions outlined below:

- A digital skills learning path is offered to all members of staff, which allows everyone to self-assess and progress over time in their mastery of digital tools.

- A web app showcasing the DGFiP was created which offers an interactive and fun course lasting 10-15 minutes, designed to provide a uniform welcome message and a preliminary overview of the DGFiP to the roughly 5 000 new employees recruited every year. The web app is available to the general public (including on smartphones), which means it can also be used as a dynamic promotional tool in DGFiP's recruitment efforts to bolster their attractiveness.

- Another web app was developed to help staff members familiarise themselves with the main ethical and professional secrecy obligations of DGFiP employees. Staff follow the adventures of a "trouble agent" through five episodes before taking a final test. With this app, ethical obligations – a major subject that must be understood by all personnel in a tax administration – are approached in a clear and entertaining way.

- Since October 2022, the initial training of DGFiP newcomers combines traditional physical classroom learning with remote sessions using a dedicated machine system learning platform during which the trainees learn independently.

See Annex 9.A for supporting material.

Source: France (2023).

References

OECD (2021), *Tax Administration 2021: Comparative Information on OECD and other Advanced and Emerging Economies*, OECD Publishing, Paris, https://doi.org/10.1787/cef472b9-en. [3]

OECD (2021), *Towards sustainable remote working in a post COVID-19 environment*, https://www.oecd.org/coronavirus/policy-responses/tax-administration-towards-sustainable-remote-working-in-a-post-covid-19-environment-fdc0844d/. [1]

OECD (2017), *Tax Administration 2017: Comparative Information on OECD and Other Advanced and Emerging Economies*, OECD Publishing, Paris, https://dx.doi.org/10.1787/tax_admin-2017-en. [2]

Note

[1] Previous editions reported the allocation of staff resources across seven functional groupings: (i) Registration and taxpayer services; (ii) Returns and payment processing; (iii) Audit, investigation and other verification; (iv) Debt collection; (v) Dispute and appeals; (vi) Information and communication technology; and (vii) Other functions. Starting with ISORA 2020 those seven groupings were reduced to the four groupings shown in Figure 9.5.

Annex 9.A. Links to supporting material (accessed on 26 May 2023)

- Box 9.1. – Chile: Link to a presentation on the automatic messaging system: https://www.oecd.org/tax/forum-on-tax-administration/database/b.9.1-chile-automatic-messaging-system.pdf
- Box 9.3. – Australia: Link to an overview slide on the ATO's System Integrity - Vulnerability Assessment Methodology: https://www.oecd.org/tax/forum-on-tax-administration/database/b.9.3-australia-system-integrity.pdf
- Box 9.4. – Japan: Link to a website with more details on the new NTA's job category "Science, Engineering, Digital": https://www.nta.go.jp/about/recruitment/digital/index.htm
- Box 9.7. – France: Link to the web app showcasing the DGFiP: https://bienvenuedgfip.veryup.pro/

10 Digital transformation journeys

This chapter examines how tax administrations are addressing the challenges presented by digital transformation, and how technology is changing their operating models.

Introduction

Over the past decade, tax administrations have invested resources in the digitalisation of tax administrations. This has seen tax administrations across the world moving away from paper based, or in person based systems to ones that embrace the digital revolution that has happened in wider society.

In parallel, digital services in the wider economy have transformed the way citizens and business complete transactions, or access services. These wider changes bring both challenges and opportunities for tax administrations, and the future of tax administration is transforming their operating models so they can take full advantage of the opportunities widespread digital technology can offer.

This is digital transformation, and it is the vision of Tax Administration 3.0 (OECD, 2020[1]), the landmark report published by the OECD in 2020. It urges tax administrations to think about how their existing processes can be reformed to become truly digital. Without fulfilling this vision, tax administration will not keep pace with the digital transformation of wider society, will find it harder to reduce burdens, create new policy approaches, and reduce compliance gaps. Tax Administration 3.0 is an ambitious vision and achieving it is an evolutionary journey, where progress will be more rapidly in some areas, and more slowly in others. Over time though this combines to form a more fully digitally transformed tax administration.

Tax Administration 3.0 identifies 6 core building blocks in digital transformation. These building blocks will provide benefits in their own right, but it is the fitting together of the building blocks over time that will achieve the more significant benefits of seamless and frictionless tax administration.

This chapter is not intended to make judgements on individual jurisdictions and the progress they are making as each digital transformation journey is unique and depends on the unique circumstances and priorities of each jurisdiction. Instead, it aims to highlight the trends in the digital transformation journeys that are being undertaken by tax administrations, against those 6 building blocks:

- Building block 1: Digital Identity
- Building block 2: Taxpayer touchpoints
- Building block 3: Data management and standards
- Building block 4: Tax rule management and application
- Building block 5: New skill sets
- Building block 6: Governance frameworks

As well as using examples of leading practice to highlight progress, this chapter draws on data from the Inventory of Tax Technology Initiatives (ITTI) (OECD et al., 2023[2]) which contains data on technology tools and digital solutions implemented by tax administrations globally. Going forward as new ITTI data becomes available, progress on these complex journeys can be revisited.

Building block 1: Digital Identity

As tax administrations deliver more and more of their services online, digital security, digital verification and digital identity is becoming the cornerstone of tax administrations' work. Tax administrations are leveraging their expertise and data sets to not only give taxpayers greater self-service access to tax administration services, but also to third parties and to wider government systems. Common digital identities are critical to these programmes. As Table 10.1 shows below, all administrations now have some sort of digital identity system in place for individuals, and almost all for businesses, laying a good foundation for digital transformation. The growing trend is for these digital identity systems to provide access to services from other parts of government or third parties.

Table 10.1. Use of digital identities, 2022

Percent of administrations that have the respective process in place

Taxpayer type	Taxpayers are required to use an approved digital identity (DI) to access secure digital services	DI used to access the services can be provided by *(multiple answers possible)*			DI offered by the tax administration can also be used to access services from	
		Tax administration	Another government body	Private sector body	Another government body	Private sector body
Individual	100	69	63	39	37	14
Business	94	67	50	35	47	9

Note: The table is based on data from 52 jurisdictions that are covered in this report and that are included in the ITTI database. For the purpose of the ITTI survey, digital identity is defined as an electronic representation of an individual or business which enables them to be sufficiently distinguished when interacting online. The digital identity includes attributes which are bound to a credential that is used to authenticate the individual or business.
Source: OECD et al. (2023), Inventory of Tax Technology Initiatives, https://www.oecd.org/tax/forum-on-tax-administration/tax-technology-tools-and-digital-solutions/, Tables DI1 and DI2 (accessed on 22 May 2023).

With the digital identity becoming more common place and more useful, Chapter 3 of this report highlights some of the recent work that has been done by tax administrations to add greater security to digital identity systems such as multi factor authentication and biometric information. However, as Table 10.2 shows all administrations use some type of authentication method to verify the digital identity when used online. The type of verification method varies, however, as can be seen in Table 10.2. password-based authentication is used by 87% of administrations, followed by multi-factor authentication and mobile app. A few administrations are also using facial recognition or finger print to authenticate the digital identity of a taxpayer. Half of the administrations reported that their use of different authentication methods is based on the level of security required for certain types of interactions.

Table 10.2. Digital identity authentication and authorisation, 2022

Percent of administrations that have the respective process in place

Authentication methods used by the tax administration						Use of different authentication methods based on the level of security required for certain types of interactions	Taxpayers can authorise third parties to access digital services
Password-based authentication	ID card	Mobile app	Facial recognition	Finger print	Multi-factor authentication		
87	38	42	13	13	62	50	87

Note: The figure is based on data from 52 jurisdictions that are covered in this report and that are included in the ITTI database.
Source: OECD et al. (2023), Inventory of Tax Technology Initiatives, https://www.oecd.org/tax/forum-on-tax-administration/tax-technology-tools-and-digital-solutions/, Tables DI5 and DI6 (accessed on 22 May 2023).

Box 10.1. Thailand: National Digital Identity Project

In Thailand, the National Digital Identity Platform (NDID) aims to provide a flexible and highly secure method of self-identification for any Thai citizen, and will be designed to leverage any reliable identity the user currently holds. By adopting NDID, the Thailand Revenue Department (TRD) expects to deliver a trustworthy and transparent solution which gives new users an adequate level of confidence in the security. In addition, NDID will provide users with safe and secure ways to manage and protect their ID online, including on their mobile devices. NDID can also improve the convenience and effectiveness of both government and private sector services.

In collaboration with the Bank of Thailand, the commercial banks and the National Digital ID Company Limited, TRD is developing a digital identification system via the NDID Platform to facilitate and safeguard online transactions and prevent fraud, starting with a pilot project on Personal Income Tax e-filing. Many taxpayers have logged in via the NDID Platform since 18th March 2021, but the pilot project has also uncovered some challenges, such as a lack of awareness of the opportunities offered by digital ID and the NDID Platform. Following up the results of the pilot, TRD and partner banks continue to encourage enhanced user adoption of the service. Furthermore, the banks will allow for self-identification via bank applications for access to the TRD's website, enabling user access to further services in the future. Some of the benefits of TRD Digital ID Authentication via the NDID Platform include:

- Improved authentication and verification standard
- High levels of accuracy
- Enhanced security
- Lower operational costs
- A better customer experience
- Integrated government agency services

Source: Thailand (2023).

Building block 2: Taxpayer touchpoints

Embedding services and processes in the natural systems used by taxpayers in their daily lives and businesses is at the heart of the Tax Administration 3.0 vision. While this helps to improve tax compliance, it also reduces administrative burdens and frees up time that owners can use to grow their businesses.

To drive these collaborations and open up new services, Figure 10.1. shows that the vast majority of tax administrations are now creating Application Programming Interfaces (APIs) and that 75% of them are making the APIs available to third party developers. Further, as part of the process of developing APIs, close to 60% of tax administrations are engaging in co-creation with third parties.

The growth of APIs is facilitating connectivity between systems without providing direct access. The example in Box 10.2 highlights how APIs can be used to transform functions across an administration. Table 10.3 highlights the wide range of uses across tax types, which is expected to grow as the digital transformation journey continues, and Table 10.4 highlights how tax administrations are increasingly connected on a machine-to-machine basis with third parties.

Figure 10.1. APIs: Development for third party use and co-creation, 2022

Percent of administrations
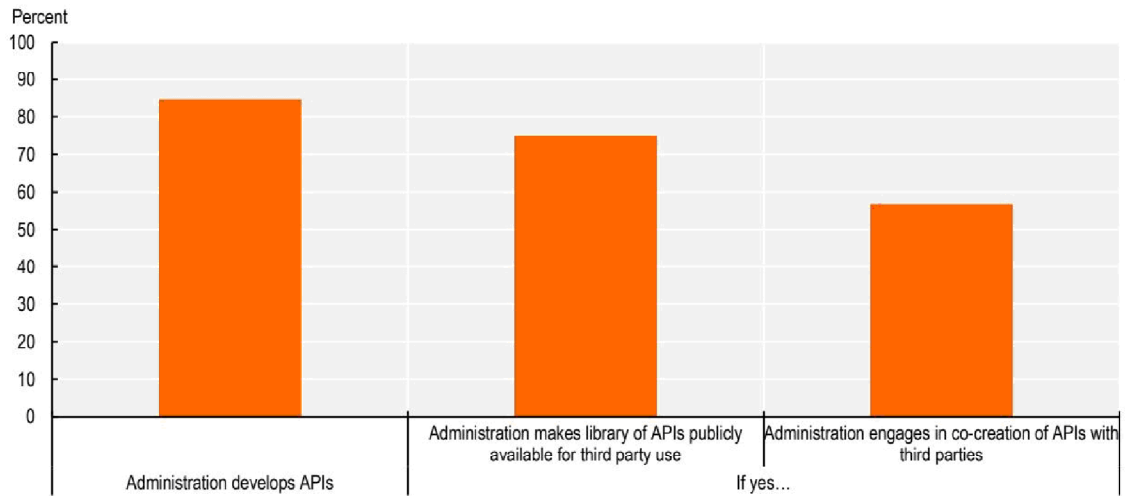
Note: The figure is based on data from 52 jurisdictions that are covered in this report and that are included in the ITTI database.
Source: OECD et al. (2023), Inventory of Tax Technology Initiatives, https://www.oecd.org/tax/forum-on-tax-administration/tax-technology-tools-and-digital-solutions/, Table TT7 (accessed on 22 May 2023).

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Box 10.2. China (People's Republic of): The Natural Systems Project

In 2022, the Natural Systems Project was proposed as an innovation based on "fully digitised e-invoice" and direct connection between tax authorities and enterprises. In line with the concept of "taxpayer touch-points" in the Digital Transformation Maturity Model of the OECD, the State Taxation Administration of China (STA) set up a Natural Systems pilot to explore the practice and effects of seamless taxation administration.

As a result, STA now publishes tax-related business rules and application programme interfaces (APIs), for taxpayers to embed in their own business systems (natural systems), independent of third-party service providers, and tax authorities conduct compliance audit using business data uploaded by taxpayers. In addition, the unified business rules help to reduce gaps in the administration among provincial STA offices, offering greater consistency and certainty to taxpayers.

Taxpayers can now become co-issuer of invoices, whereas previously, STA was the issuer of invoices. In the case of "fully digitised e-invoice", taxpayers can have solely issue invoices in line with the relevant rules.

The Natural Systems Project integrates business, finance and taxation through an invoice data model with "additional elements", and taxpayers can determine those additional invoice elements for themselves. For example, an e-commerce platform can add order and logistics information as additional elements to the invoice data model by itself, so it can meet its own need of enhanced order management.

Source: China (People's Republic of) (2023).

Table 10.3. Interactions for which administrations have published APIs by tax type, 2022

Percent of administrations that have published the respective APIs

Interaction type	Personal income tax	Corporate income tax	Value added tax
Registration for tax	18	30	30
Filing tax returns	43	43	43
Making payments	30	32	32
Requesting extensions of deadlines	11	9	11
Asking for payment arrangements	7	5	5
Making taxpayer confidential enquiries	11	21	18
Filing tax related objections	0	2	5
Dealing with correspondence	25	27	27
Uploading data files onto tax administration's systems	25	30	32
Other interactions *(not by tax type)*		34	

Note: The table is based on data from 52 jurisdictions that are covered in this report and that are included in the ITTI database.
Source: OECD et al. (2023), Inventory of Tax Technology Initiatives, https://www.oecd.org/tax/forum-on-tax-administration/tax-technology-tools-and-digital-solutions/, Tables TT8, TT9 and TT10 (accessed on 22 May 2023).

Table 10.4. Receiving data from taxpayer business systems and third parties, 2022

Percent of administrations that have the respective process in place

Administration receives data directly from taxpayer business systems (beyond PAYE systems)	If yes…		Administration receives data directly from third parties	If yes…	
	Some data can be sent automatically from machine-to-machine without human involvement	Some data can be uploaded manually via dedicated interfaces		Some data can be sent automatically from machine-to-machine without human involvement	Some data can be uploaded manually via dedicated interfaces
80	83	93	86	91	89

Note: The table is based on data from 52 jurisdictions that are covered in this report and that are included in the ITTI database.
Source: OECD et al. (2023), Inventory of Tax Technology Initiatives, https://www.oecd.org/tax/forum-on-tax-administration/tax-technology-tools-and-digital-solutions/, Tables DM1 (accessed on 22 May 2023).

As the services delivered through APIs become more sophisticated, and play a greater role in delivering a quality service to taxpayers, tax administrations are having to invest more in the management and oversight of their APIs. Chapter 5 considers this in more detail, but at the heart of this work is effective collaboration with third parties to ensure that the systems work smoothly, are accurate and secure and continue to deliver for taxpayers.

Furthermore, as the data received from tax administrations is just part of the wider flow of data within the ecosystem that Tax Administration 3.0 envisages, underpinning the digital transformation journey is the utilisation of data sciences techniques and use analytical tools, and this is explored in more detail later in this report. However, it is worth highlighting that tax administrations now routinely:

- **Use of large and integrated data sets**. Manipulating and managing data is now a core part of a tax administration's functions, with the use of analytics tools and techniques being incorporated into all areas of tax administrations. Around 90% of tax administrations report using data science and analytical tools, and this is facilitating the use of data in all aspects of an administration's work.

- **Use of artificial intelligence and machine learning**. As tax administrations become more comfortable with managing large data sets and computing power increases, the use of artificial intelligence and machine learning is opening up new approaches in risk management. Figure 10.3

(see the section on building block 4) highlights that around 50% of tax administrations report that they are already using artificial intelligence in their compliance risk assessment work.

This sophisticated use of data from an increasingly connected system is allowing the development of new platforms and services that can bring significant changes to the operating models of a tax administration as illustrated in Box 10.3.

Box 10.3. Singapore: Digital transformation of IRAS' core tax administration system

The Inland Revenue Interactive Network (IRIN) is the Inland Revenue Authority of Singapore's (IRAS) core tax administration ICT system. IRIN provides taxpayers with access to eServices via MyTaxPortal which caters to all individuals and business, allowing taxpayers to make payments, electronically file their taxes and manage their account. IRIN also facilitates core processing, enforcement and analytics capabilities for IRAS officers.

In line with IRAS' digital transformation plan to redefine tax officers' and taxpayers' experience, the refresh of the core tax administration system, via the implementation of IRIN 3, was identified as a key technology enabler for IRAS's business transformation.

IRIN 3 is a multi-year programme that has been designed and planned for implementation over 3 Phases. Phase 1 has seen the implementation of a Document Management System and Digital Notice Platform. Phase 2 has introduced the foundation of IRIN 3 with the implementation of microservices architecture on Government Commercial Cloud for Stamp Duty. Phase 3 will progressively extend the implementation across Individual Income Tax, Property Tax, Corporate Tax, Goods and Services Tax, and all other tax types.

With IRIN 3 Phase 2, IRAS revamped its Integrated Stamp Duty System and migrated it to cloud for better scalability and availability of commercial capabilities, building on microservice architecture to enable agility and speed to market. Taxpayers can now manage Stamp Duty matters anytime, anywhere with a mobile-friendly portal. e-Stamping is now made simple with quick overview access to statuses of documents, records and digital services. The system has also been enhanced to enable payment of multiple records at once. Since the launch of the IRIN 3 Phase 2 up till Feb 2023, more than 120 000 stamp certificates have been generated.

Source: Singapore (2023).

Building block 3 Data management and standards

As this use of data grows, information confidentiality and security is even more essential to the relationship between tax administrations and taxpayers. It also underpins the exchange of information in tax matters between governments, as in a system where sensitive data is moving on an automatic basis, and in real time, all parties need to be confident in the frameworks that ensure data is managed correctly, securely and to the relevant standards.

These frameworks are also essential for defining how the administration manages data most effectively to maximise compliance and minimise burdens. In particular, this concerns the choices around where data is processed for different tax functions (within the administration, within the taxpayers' natural systems or both), and the requirements for quality, availability and reporting of tax relevant data as well as metadata on the operation of taxpayers' systems. As Box 10.4 highlights these changes can require structural shifts

in the way a tax administration manages its IT systems, but doing so creates a solid foundation for new digital projects and services.

Box 10.4. China (People's Republic of): Improved management of IT systems

With the wider development of "digital China", the digital transformation of tax administration has been growing. To support this, the State Taxation Administration of China (STA) built a platform for the management and control of its whole IT systems, managing all the components in the systems including software, hardware and data. There are four building blocks, namely software, hardware, data and internal control. In the software part, each of the thousands of pieces of software in the system is given a unique ID. In the hardware part, all the equipment and assets are registered and matched with relevant software. In the data part, trillions of data entries are recorded and a so-called data dictionary is compiled. In the internal control part, rules and regulations are put in place to supervise the interaction among systems, tax officials, suppliers and other stakeholders.

This uses the following technological approaches.

- Artificial intelligence, including natural language processing is utilised for comparison and de-duplication analysis
- Rules and regulations are integrated into the business process in the platform with full automatic flow, operation marks and task reminders, which significantly improves the quality and efficiency of information management. For example, with the launch of "data dictionary", means tasks can be completed in hours from 2 days previously.
- The classification and gathering, of analysis and the visual presentation of key information are realised in the platform laying a solid foundation for evidence based decision-making. In asset management and control, resource gaps and redundancies can be discovered via association and matching of hardware and software.

Source: China (People's Republic of) (2023).

Table 10.5. Data governance, 2022

Percent of administrations that have the respective process in place

Comprehensive data management strategy exists	Data quality of reported data is assessed	Data ethics framework in place	User data access and security is controlled	Unauthorised access is automatically detected	Data Privacy Officer is employed	Cyber security unit exists	External parties hired to test the security of systems
66	88	74	100	84	90	90	82

Note: The table is based on data from 52 jurisdictions that are covered in this report and that are included in the ITTI database.
Source: OECD et al. (2023), Inventory of Tax Technology Initiatives, https://www.oecd.org/tax/forum-on-tax-administration/tax-technology-tools-and-digital-solutions/, Table DM4 (accessed on 22 May 2023).

As Table 10.5 illustrates, the implementation of mechanisms to protect and manage data is now commonplace across administrations, and is a critical function of tax administrations. These support wider data governance processes, and in turn help maintain the taxpayer trust in the system as well as meet legal obligations. It is worth noting that as data systems become more connected, so the importance of cyber security is growing, and Box 10.5 shows some of the latest practices from tax administrations in this space.

Box 10.5. Examples: New cybersecurity strategies

Australia

The Australian Taxation Office (ATO) remains committed to improving its cyber security resilience by investing in new technologies and initiatives through the Cyber Security Program. The ATO Cyber Program focuses on modernising and maturing cyber security capabilities and applying sufficient mitigations to the overall cyber risk profile to ensure confidentiality, integrity, and availability of ATO systems. The Program is in the process of deploying new technologies that uplift the ATOs cyber capabilities including:

- Recording of endpoint activities across the ATO, providing a view of threats and alerts in real time and intelligence of trending activities across the digital ecosystem.
- Ability to scan all IT assets for vulnerabilities providing regular reporting to application and infrastructure support teams and partners of exposures including out of support software.
- Deployment of an enterprise solution to centrally manage privileged accounts and access across the ATO's environment.
- Strengthening network security by segmenting the flow of traffic.
- Implementing initiatives to protect against malicious code by only allowing approved interactions to execute on ATO applications.

The ATO employs a 'defence in depth' approach to mitigate cyber security incidents by utilising security technologies layered across the ecosystem. In 2022 the ATO migrated to a contemporary Secure Internet Gateway (SIG) capability protecting the ATO's perimeter.

The ATO is also involved in carrier level SMS blocking, and regular international intelligence sharing to discuss tax impersonation scam observations, emerging methodologies, awareness, and scam disruption and prevention on a global scale.

Hungary

The 24/7 security operation centre (SOC) is essential for the Hungarian National Tax and Customs Administration (NTCA) because it provides an opportunity not only to implement IT security-oriented system supervision in addition, but also it makes it possible to detect and prevent new, previously unknown or unrecognised attacks as well. Through SOC the NTCA is able to detect incidents as soon as possible and provide an immediate solution to them.

This increases the administration's resilience to cyber threats. and performs significant preventive work. The core pillar of this work is the interconnection of automated cyber-threat detection, vulnerabilities detection systems and traditional border protection systems in the NTCA. With these, the firewall rules are modified, clarified and filtered without human intervention using threat indicators from the vulnerability detection tool.

Security awareness plays a strategic role in the life of the NTCA but security can only be maintained if the employees are aware of it. Despite continuous IT security improvements, the user is still the weakest link in the chain, so users should not be left out when designing and implementing systems protection solutions.

Social engineering techniques and the increasingly sophisticated forms of psychological manipulation pose a significant threat to NTCA, therefore more and more attention needs to be paid to the security awareness training of users. To this end, the IT security department of the NTCA conducts regular

training, safety awareness assessment and evaluation. Theoretical and practical tests are also included in the assessments, which are already showing a continuous improvement.

See Annex 10.A. for supporting material.

Mexico

The Mexican Tax Administration Service (SAT) adopts a layered security approach that enhances protection against and detection of advanced threats. One of these measures involves the automated analysis of emails to identify ransomware threats and command and control codes embedded within downloaded files. For instance, if an attack commences with an email containing a zero-day ransomware threat, which is specifically designed to bypass traditional security techniques, the SAT's security approach promptly sends the attached file to a controlled sandbox environment.

Within this environment, the file's behaviour undergoes analysis, enabling the identification of the attack's nature. In real-time, a response is generated with a flagged identification of the file, leading to automatic blocking should it be encountered elsewhere in the future. This proactive approach significantly strengthens the Administration's ability to mitigate potential threats and swiftly neutralise them.

Sources: Australia (2023, Hungary (2023) and Mexico (2023).

As Figure 10.2 highlights data management is now evolving towards a "collect once, use many times" across government approach which is part of the Tax Administration 3.0 vision. Tax administrations (together with social security agencies) have a special place within government in this respect since they will often hold up-to-date verified information on identity, will be involved in both receiving and making payments and will receive and send information to third parties (such as financial institutions and employers). This adds a further dimension to the data management and governance given multiple agencies may be involved.

Figure 10.2. Data sharing with other parts of the government, 2022

Percent of administrations
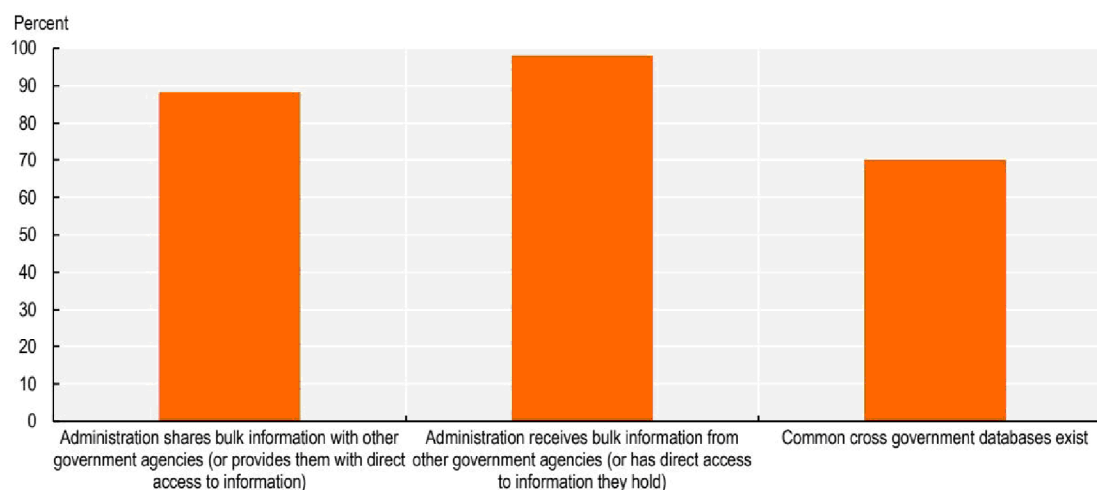
Note: The figure is based on data from 52 jurisdictions that are covered in this report and that are included in the ITTI database.
Source: OECD et al. (2023), Inventory of Tax Technology Initiatives, https://www.oecd.org/tax/forum-on-tax-administration/tax-technology-tools-and-digital-solutions/, Table DM3 (accessed on 22 May 2023).

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Building block 4: Tax rule management and application

In the Tax Administration 3.0 vision, instead of rules being contained within the tax administration system, and instructions issued to taxpayers through guidance on how to comply through forms, the technical rules and information needed for elements of tax processing are provided so that they can take place within taxpayers' natural systems. This could be, for example automatic registration and deregistration of the taxpayer at specified points, the incorporation of tax law rules and computations into accounting software or the use of applications to withhold tax or to automatically send information to the administration.

To start on this process Tax administration 3.0 sets out how administrations may wish to consider:

- Implementing systems-independent tax rule specification for integration into taxpayers' own business management systems (for example, in regards to digital identification, e-invoicing and reporting or withholding by digital platforms).
- Piloting the development of tax rule specification, in co-operation with developers, alongside the development of new tax legislation.
- Piloting the implementation of artificial intelligence in tax administration advisory and assessment processes aimed at minimising tax uncertainty

This is a challenging undertaking. However, there are areas of progress, for example, the Netherlands Tax Administration has been working on a new method of software development, that makes certain elements of law machine readable, and this is also tracked so that when the law changes, the update can be made quickly and easily. These rules are opening up possibilities for automated decision making.

Table 10.6. Software packages: (Co-)creation, assurance frameworks, and approved products, 2022

Percent of administrations that have the respective process in place

Administration creates software packages that assist taxpayers to fulfil their tax obligations	Administration engages in co-creation of software packages with third parties	Administration has developed an assurance framework that allows 3rd parties to incorporate tax rules in their software packages and deliver outputs based on those rules that are accepted by the tax administration	Administration publishes names of approved or recognised software products	Administration maintains a register of approved or recognised software products
58	48	31	26	32

Note: The table is based on data from 52 jurisdictions that are covered in this report and that are included in the ITTI database.
Source: OECD et al. (2023), Inventory of Tax Technology Initiatives, https://www.oecd.org/tax/forum-on-tax-administration/tax-technology-tools-and-digital-solutions/, Tables TT7 and TRM2 (accessed on 22 May 2023).

Tax administrations have however been making significant progress on artificial intelligence. As Figure 10.3 highlights, around 50% of administrations are using it for risk assessment and also fraud detection. These services are opening up opportunities for innovative approaches, such as filing through completing a questionnaire or helping to automate taxpayer enquiries. This is making chatbots, which have been a feature of previous editions of this series 'smart'. See Chapter 5 of this report for more detail.

Figure 10.3. Use of artificial intelligence, 2022
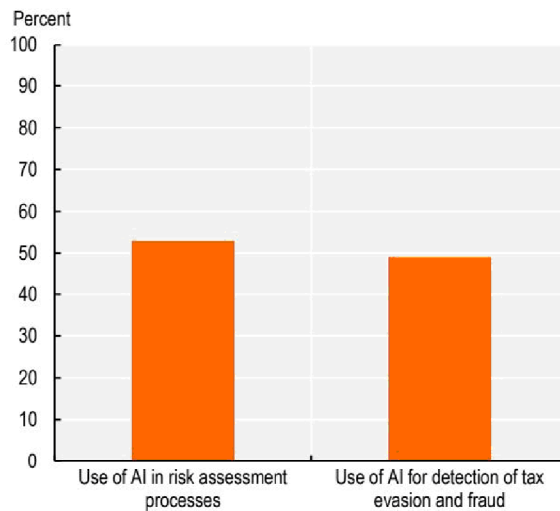
Percent of administrations

Note: The figure is based on data from 52 jurisdictions that are covered in this report and that are included in the ITTI database.
Source: OECD et al. (2023), Inventory of Tax Technology Initiatives, https://www.oecd.org/tax/forum-on-tax-administration/tax-technology-tools-and-digital-solutions/, Table TRM3 (accessed on 22 May 2023).

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It is expected that the use of artificial intelligence will be a growing feature of this series. However, as the example in Box 10.6 highlights, the use of this technology also brings governance questions which need to be considered.

Box 10.6. Canada: Embedding artificial intelligence into a tax projects

To support its experimentation with and responsible deployment of artificial intelligence (AI) solutions, the Canada Revenue Agency (CRA) continues to strengthen AI governance and oversight. As part of the governance suite, the CRA put in place the Directive on Artificial Intelligence in January 2021.

This Directive sets out the roles and responsibilities within the CRA and is supported by the mandatory use of the Algorithmic Impact and Alignment Assessment (AIAA) Tool. The AIAA has a three-fold purpose. The AIAA is open by design, it serves as a central repository of AI projects at the CRA that all users can view to enhance horizontality. To assess alignment and to potentially focus our resources, the AIAA categorises AI projects based on CRA's core business priorities.

Finally, the AIAA tool evaluates and calculates an associated risk score to AI projects in the development and production phases, including mitigations and ethical considerations. Through the metric collected, the AIAA allows for the CRA to report on what is happening where. As AI governance continues to mature and respond to the rapidly evolving AI context, so will the AIAA tool evolve to support informed oversight and promote transparency.

Source: OECD (2021), *Tax Administration 2021: Comparative Information on OECD and other Advanced and Emerging Economies*, https://doi.org/10.1787/cef472b9-en.

Building block 5: New skill sets

Digital transformation brings a fundamental shift to the operating models of tax administration, which means that not only will new staff need to be hired, but the skills of existing staff may need to be developed. HR management, and change processes are a core building block of Tax Administration 3.0. Figures 10.4. and 10.5. highlight how tax administrations are preparing the ground for digital transformation by mapping the skills needed for digital transformation, and investing in staff training to build capability.

Figure 10.4. Skills for digital transformation: Identification and mapping, 2022

Percent of administrations
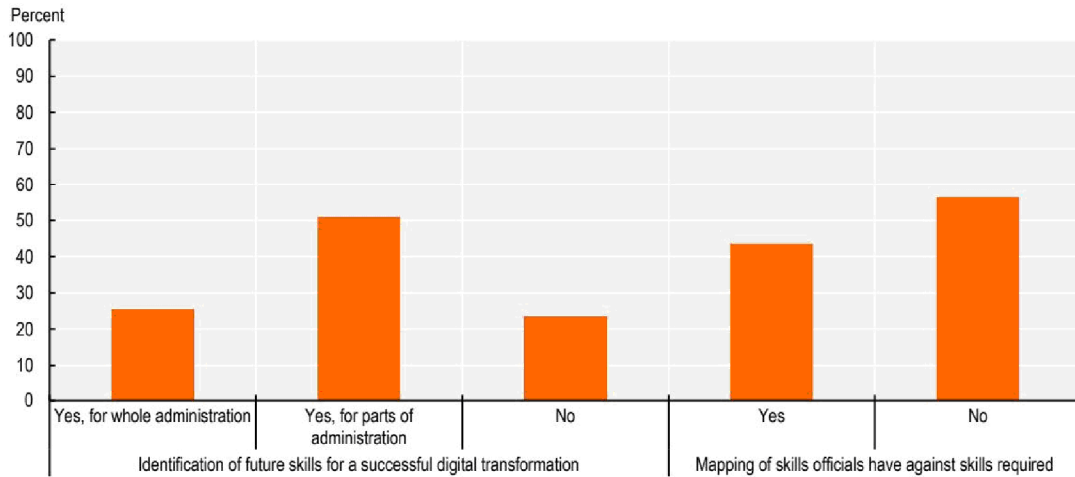
Note: The figure is based on data from 52 jurisdictions that are covered in this report and that are included in the ITTI database.
Source: OECD et al. (2023), Inventory of Tax Technology Initiatives, https://www.oecd.org/tax/forum-on-tax-administration/tax-technology-tools-and-digital-solutions/, Table SG3 (accessed on 22 May 2023).

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As highlighted earlier in this chapter, the digital transformation of tax administrations has wider impacts across the ecosystem. It is for this reason that many tax administrations have invested in the collaborative development of skills as shown in Figure 10.5., reflective of the wide impacts that digital transformation brings, and the need for shared approaches.

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Figure 10.5. Skills for digital transformation: Collaboration with government organisations or external partners, 2022

Percent of administrations
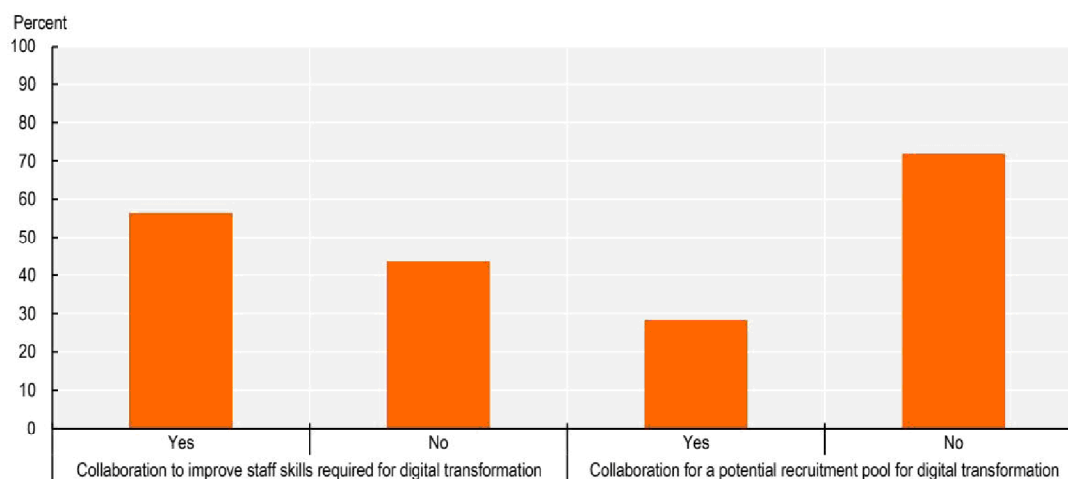
Note: The figure shows information for those administrations that have identified the future skills needed for a successful digital transformation either for the whole administrations or for parts of it (see Figure 10.4.). It is based on data from 52 jurisdictions that are covered in this report and that are included in the ITTI database.
Source: OECD et al. (2022), Inventory of Tax Technology Initiatives, https://www.oecd.org/tax/forum-on-tax-administration/tax-technology-tools-and-digital-solutions/, Table SG3 (accessed on 22 May 2023).

StatLink 🖳 https://stat.link/c6rb87

Digital culture

In addition to the skills required to deliver digital transformation, tax administrations are also having to consider the mindset shifts that it requires. This ensures the digital needs of taxpayers and other stakeholders are understood and embraced by staff; new services are demand driven, innovative, and created considering potential cross-functional synergies; and projects are managed in an agile fashion. As Table 10.7. highlights, this is an area of work becoming common in tax administrations.

Table 10.7. Digital culture, communication and engagement, 2022

Percent of administrations that have the respective process in place

| Strategy to build a digital culture within the administration has been developed	Administration communicates the digital transformation strategy or changes to all officials so that they understand their individual roles and responsibilities	Administration regularly engages with staff and other stakeholders on the digital transformation strategy, its implementation and progress
59	69	67

Note: The table is based on data from 52 jurisdictions that are covered in this report and that are included in the ITTI database.
Source: OECD et al. (2023), Inventory of Tax Technology Initiatives, https://www.oecd.org/tax/forum-on-tax-administration/tax-technology-tools-and-digital-solutions/, Tables SG4 (accessed on 22 May 2023).

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Delivering this mindset shift is no small undertaking, and in parallel, one of the challenges of remote or hybrid working arrangements is maintaining staff training and organisational culture. As a result of all these factors, tax administrations have been reconsidering their approaches to delivering general training. Tax administrations report moving their training programmes into a virtual environment, using live online training sessions or pre-recorded videos/webinars.

While moving to a virtual training environment may have some up-front costs, it may save costs in the longer term as once produced, pre-recorded training material can be viewed at any time, from anywhere. Remote training can reduce travel expenses and can allow staff to learn at their own pace and convenience as well as increasing the number of staff members that can follow a course. New technologies are also helping facilitate the collaborative learning aspects, increasing the quality of the training experience.

Building block 6: Governance frameworks

Digital transformation has seen tax administrations throughout the world adopt new digital transformation strategies that address the fundamental shifts in operating models that it requires. There is no one size fits all approach to this work, and to support it the Forum on Tax Administration has created a *Digital Transformation Maturity Model*, which allows self-assessment by tax administrations of the current level of maturity and to facilitate consideration of future strategy, depending on a tax administration's unique circumstances and priorities. (OECD, 2022[3])

As Figure 10.6. shows, the model has been completed by over 50 tax administrations, and the results of this are guiding and supporting those jurisdiction strategies.

Figure 10.6. Digital Transformation Maturity Model self-assessment results

Source: OECD (2022), Digital Transformation Maturity Model, www.oecd.org/tax/forum-on-tax-administration/publications-and-products/digital-transformation-maturity-model.htm (accessed on 22 May 2023).

As highlighted earlier, the strategy that guides digital transformation is a key building block and Figure 10.7. highlights that already around 75% of administrations have a digital transformation strategy in place. Tax administrations report that these strategies are driving their services to become 'smarter', allowing taxpayers to complete increasingly complex tasks digitally, more efficiently and 24/7. This is also helping to bring important improvements in taxpayer compliance.

Figure 10.7. Existence of a strategy for digital transformation in tax administrations, 2022

Percent of administrations
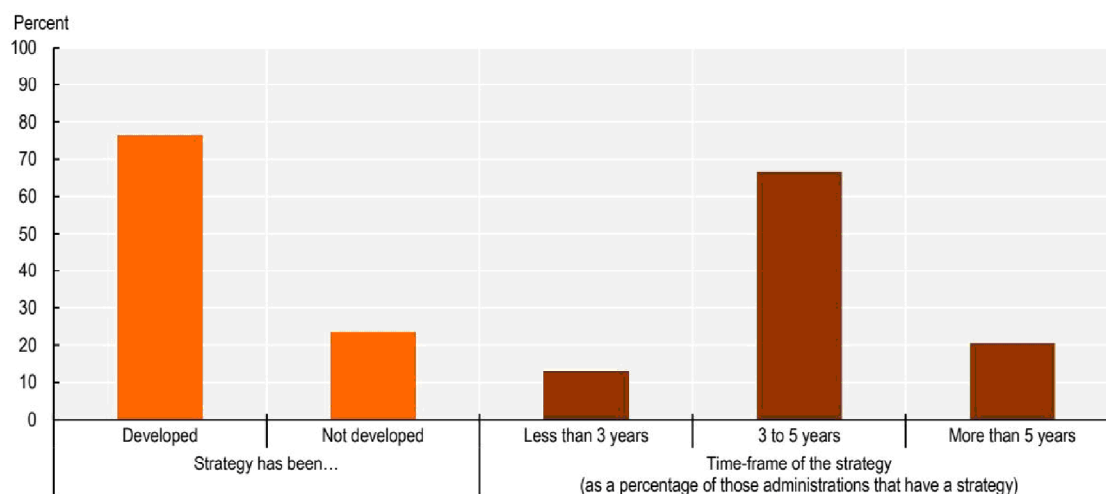
Note: The figure is based on data from 52 jurisdictions that are covered in this report and that are included in the ITTI database.
Source: (OECD et al. (2023), Inventory of Tax Technology Initiatives, https://www.oecd.org/tax/forum-on-tax-administration/tax-technology-tools-and-digital-solutions/, Table SG1 (accessed on 22 May 2023).

StatLink https://stat.link/ckxa9q

Central to the Tax Administration 3.0 vision is collaboration and co-creation. This is because as tax systems and processes become embedded in the wider ecosystems of taxpayers, it is therefore essential for an effective strategy that stakeholders have a role in the development of any digital transformation strategy. As a result, and as Figure 10.8. and the example in Box 10.7. highlight, this collaboration is becoming a common feature of strategies.

### Box 10.7. Finland: Citizen involvement in digital strategies

The Finnish Tax Administration has included citizen feedback as part of the process of digitising its internal processes and pursuing data-driven management. Non-technical officials have used a no code / low code platform to create a fully-fledged app for processing stakeholders' formal complaints that may arise in case of alleged inadequate or unlawful procedures or misconduct/negligence of duty by the tax officials. The app takes each complaint through all the steps along the case workflow across all parties concerned.

The app is connected to the Tax Administration's comprehensive digital data room which gathers a wide array of information and indicators on the organisational performance. The data room reporting shows the statuses, subject areas, evaluations and other attributes of the complaints in real-time, thus feeding evidence-based continuous improvement. The creation of the app showcases the potential of internal crowdsourcing within the Tax Administration to speed up digitalisation in a flexible and agile way.

Source: Finland (2023).

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Figure 10.8. Digital transformation strategy: Stakeholder involvement, use of data analysis and monitoring, 2022

Percent of administrations that have developed a strategy
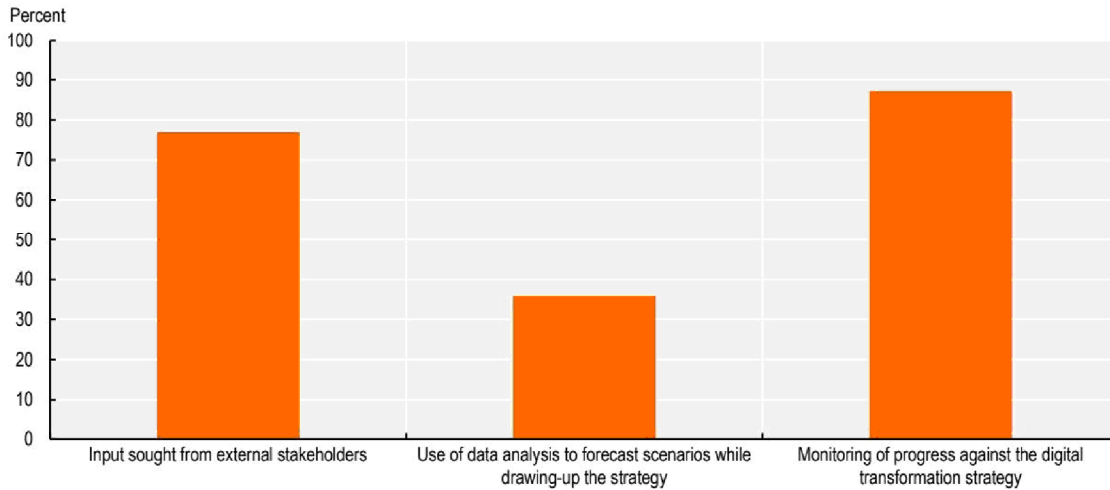
Note: The figure is based on data from 52 jurisdictions that are covered in this report and that are included in the ITTI database.
Source: OECD et al. (2023), Inventory of Tax Technology Initiatives, https://www.oecd.org/tax/forum-on-tax-administration/tax-technology-tools-and-digital-solutions/, Table SG1 (accessed on 22 May 2023).

StatLink https://stat.link/h1z3pb

These stakeholder insights can help provide the qualitative feedback that can complement the data analytics that some tax administrations are using to support their strategy development (see Figure 10.8.) Box 10.8. illustrates how this is done in practice.

Box 10.8. Digital transformation strategies

Australia

In August 2022 the Australian Taxation Office (ATO) delivered its refreshed Digital Strategy (2023-2025) which outlines critical next steps in the digital transformation journey of the ATO. The ATO vision is to become a leading digital business shaping trusted and effective digital services and ecosystems. The strategy is based on the concept of 'digitalisation rather than digitisation' and provides the opportunity to reflect on ATO's progress, seek ways to maximise the investment in existing technologies and identifies critical priorities over the next three years.

Framed by four pillars and underpinned by five principles, the strategy aims to continue the digitalisation of processes and services to improve the client and staff experience, drive improved tax performance and reduce administration costs. The refresh was initiated in response to the rapidly evolving digital landscape, increased demand for quality digital experiences and services from government, and the need to adapt quickly and effectively to changing environments.

While the ATO is considered globally as a digitally mature organisation, it recognised the need to develop a consistent approach across the organisation to build on the existing robust foundations and prioritise the right initiatives towards Tax Administration 3.0.

To achieve this, extensive stakeholder consultation was undertaken (internally and externally) throughout the development of the strategy. This included:

- Establishing a reference group made up of key senior executives in the ATO to shape the strategy;
- Holding focus groups with technical experts, project officers and other staff to gather insights and feedback;
- Engaging key ATO business areas, technical teams and segment owners to ensure alignment and inclusion of respective priorities and aspirations; and
- Engaging external forums (for example, Digital Software Providers working group) to test the ATO approach and direction.

Proactively engaging and involving stakeholders early in the development process allowed the ATO to strike a balance between setting shorter term, practical targets and building up the foundations required to achieve ATO's future aspirations.

Canada

The Strategic Planning Framework (Framework) was developed to guide decision-making and investments as the CRA pursues its vision of being a world-class tax and benefits administration that is trusted, fair and helpful by putting people first.

The Framework links the strategic priorities and guiding principles to the CRA's mission, vision, values, and ultimate outcomes. The strategic priorities state what the CRA will do over the near, medium and longer-term planning horizons to better realize its ultimate outcomes, and the guiding principles articulate how it will do it.

Over the planning horizons, the CRA will prioritize delivering a seamless client experience that is digital first; combatting aggressive tax planning and evasion; strengthening security and privacy; and nurturing a high performing diverse workforce. In delivering these priorities, the CRA is committed to applying a user-centric lens to its programs and services; leveraging an enterprise and data-driven approach and promoting effective collaboration with existing and new partners.

Annually, the CRA deliberately takes stock of drivers of change in its external environment, Government of Canada priorities, and in its performance, including in the comparative context of the International Survey on Revenue Administration (ISORA) data, to determine its planning objectives according to this framework over multiple planning horizons.

Leveraging the stock take to inform how the CRA advances both the priorities and applies the guiding principles ensures synergies in what it is doing today and what it needs to do tomorrow to achieve its vision.

See Annex 10.A. for supporting material.

Sources: Australia (2023) and Canada (2023).

The implementation of digital transformation strategies is very resource intensive both from a personnel and financial perspective. Given that it is a multi-year process it requires a solid funding structure, which is ideally ring-fenced, so it is guaranteed that the tax administration can plan and support the transitioning from start to end. Without this certainty of funding, an already difficult process can be made even harder not only for the tax administration but also for taxpayers. As Figure 10.9. highlights, in this respect, only about half of the tax administration have ring-fenced funding to support the transitioning to a digital tax administration.

Figure 10.9. Digital transformation governance, 2022

Percent of administrations
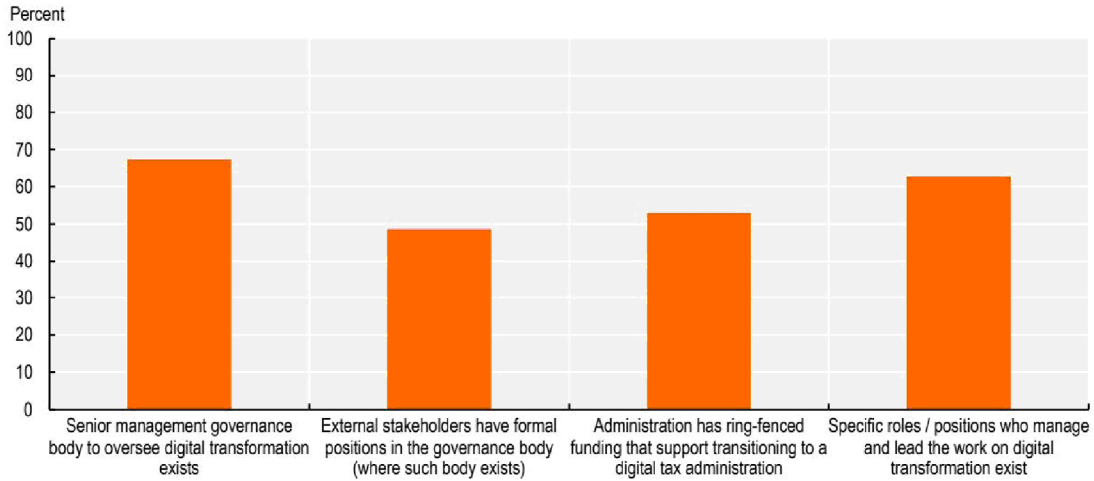
Note: The figure is based on data from 52 jurisdictions that are covered in this report and that are included in the ITTI database.
Source: OECD et al. (2022), Inventory of Tax Technology Initiatives, https://www.oecd.org/tax/forum-on-tax-administration/tax-technology-tools-and-digital-solutions/, Table SG2 (accessed on 22 May 2023).

StatLink https://stat.link/54b2x6

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OECD (2021), *Tax Administration 2021: Comparative Information on OECD and other Advanced and Emerging Economies*, OECD Publishing, Paris, https://doi.org/10.1787/cef472b9-en.   [4]

OECD (2020), *Tax Administration 3.0: The Digital Transformation of Tax Administration*, OECD, Paris, https://www.oecd.org/tax/forum-on-tax-administration/publications-and-products/tax-administration-3-0-the-digital-transformation-of-tax-administration.htm (accessed on 22 May 2023).   [1]

OECD et al. (2023), *Inventory of Tax Technology Initiatives*, https://www.oecd.org/tax/forum-on-tax-administration/tax-technology-tools-and-digital-solutions/ (accessed on 22 May 2023).   [2]

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Annex 10.A. Links to supporting material (accessed on 26 May 2023)

- Box 10.5. – Hungary: Link to a video with more detail on the security operation centre of the NTCA: https://youtu.be/-qULPb7267U
- Box 10.8. – Canada: Link to an overview slide on the CRA's Strategic Planning Framework: https://www.oecd.org/tax/forum-on-tax-administration/database/b.10.8-canada-strategic-planning-framework.pdf

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Annex A. Data tables

Annex A contains the set of tables which hold the data provided by tax administrations in response to the 2020, 2021 and 2022 International Survey on Revenue Administration (ISORA). It covers the 58 jurisdictions that participate in the 2023 edition of the OECD's Tax Administration Series.

It is available separately and can be found on the dedicated OECD iLibrary page at: https://doi.org/10.1787/900b6382-en, under the table of contents.

Annex B. Participating tax administrations

Table A B.1. Overview of tax administrations included in this report

Jurisdiction	Tax administration	Website address	Currency code
Argentina	Federal Administration of Public Revenues	www.afip.gob.ar	ARS
Australia	Australian Taxation Office	www.ato.gov.au	AUD
Austria	Federal Ministry of Finance	www.bmf.gv.at	EUR
Belgium	Federal Public Service Finance	https://finances.belgium.be	EUR
Brazil	Federal Revenue Service of Brazil	www.rfb.gov.br	BRL
Bulgaria	National Revenue Agency	https://nap.bg/	BGN
Canada	Canada Revenue Agency	www.cra-arc.gc.ca	CAD
Chile	Servicio de Impuestos Internos	www.sii.cl	CLP
China (People's Republic of)	State Taxation Administration	www.chinatax.gov.cn	CNY
Colombia	National Tax and Customs Administration	www.dian.gov.co	COP
Costa Rica	Directorate of Taxation, Ministry of Finance	www.hacienda.go.cr	CRC
Croatia	Tax Administration, Ministry of Finance	www.porezna-uprava.hr	HRK
Cyprus	Cyprus Tax Department	www.mof.gov.cy/tax	EUR
Czech Republic	Financial Administration of the Czech Republic	www.financnisprava.cz	CZK
Denmark	Danish Tax Administration	www.skatteforvaltningen.dk	DKK
Estonia	Estonian Tax and Customs Board	www.emta.ee	EUR
Finland	Finnish Tax Administration	www.vero.fi	EUR
France	Direction Générale des Finances Publiques (General Directorate of Public Finances)	www.economie.gouv.fr/dgfip	EUR
Georgia	Georgia Revenue Service	www.rs.ge	GEL
Germany	Federal Ministry of Finance, Federal Central Tax Office, and the State Tax Authorities	www.bundesfinanzministerium.de	EUR
Greece	Independent Authority for Public Revenue	www.aade.gr	EUR
Hong Kong (China)	Inland Revenue Department	www.ird.gov.hk	HKD
Hungary	National Tax and Customs Administration	https://nav.gov.hu	HUF
Iceland	Directorate of Internal Revenue	www.rsk.is	ISK
India	Income Tax Department / Central Board of Indirect Taxes & Customs	www.incometaxindia.gov.in / www.cbic.gov.in	INR
Indonesia	Directorate General of Taxes	www.pajak.go.id	IDR
Ireland	Office of the Revenue Commissioners	www.revenue.ie	EUR
Israel	Israel Tax Authority	www.taxes.gov.il	ILS
Italy	Revenue Agency	www.agenziaentrate.gov.it	EUR
Japan	National Tax Agency	www.nta.go.jp	JPY
Kenya	Kenya Revenue Authority	www.kra.go.ke/en/	KES
Korea	National Tax Service	www.nts.go.kr	KRW
Latvia	State Revenue Service	www.vid.gov.lv	EUR
Lithuania	State Tax Inspectorate under the Ministry of Finance	www.vmi.lt	EUR
Luxembourg	Administration des contributions directes (Direct Tax Administration) / Administration de l'enregistrement et des domaines (Indirect Tax Administration)	www.impotsdirects.public.lu / www.aed.public.lu	EUR
Malaysia	Inland Revenue Board of Malaysia	www.hasil.gov.my	MYR

Jurisdiction	Tax administration	Website address	Currency code
Malta	Office of the Commissioner for Revenue	https://cfr.gov.mt	EUR
Mexico	Tax Administration Service	www.sat.gob.mx	MXN
Morocco	General Administration of Taxes	www.tax.gov.ma	MAD
Netherlands	Netherlands Tax Administration	www.belastingdienst.nl	EUR
New Zealand	Inland Revenue Department – Te Tari Taake	www.ird.govt.nz	NZD
Norway	Norwegian Tax Administration	www.skatteetaten.no	NOK
Peru	Superintendencia Nacional de Administración Tributaria (SUNAT)	www.sunat.gob.pe	PEN
Poland	National Revenue Administration	www.finanse.mf.gov.pl	PLN
Portugal	Portuguese Tax and Customs Authority	www.portaldasfinancas.gov.pt	EUR
Romania	National Agency for Fiscal Administration	www.anaf.ro	RON
Saudi Arabia	Zakat, Tax and Customs Authority	https://zatca.gov.sa	SAR
Singapore	Inland Revenue Authority of Singapore	www.iras.gov.sg	SGD
Slovak Republic	Financial Administration of the Slovak Republic	www.financnasprava.sk	EUR
Slovenia	Financial Administration of the Republic of Slovenia	www.fu.gov.si	EUR
South Africa	South African Revenue Service	www.sars.gov.za	ZAR
Spain	Spanish Tax Agency (AEAT)	www.agenciatributaria.es	EUR
Sweden	Swedish Tax Agency	www.skatteverket.se	SEK
Switzerland	Federal Tax Administration	www.estv.admin.ch	CHF
Thailand	The Revenue Department	www.rd.go.th	THB
Türkiye	Turkish Revenue Administration	www.gib.gov.tr	TRY
United Kingdom	HM Revenue & Customs	www.hmrc.gov.uk	GBP
United States	Internal Revenue Service	www.irs.gov	USD

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Tax Administration 2023

COMPARATIVE INFORMATION ON OECD AND OTHER ADVANCED AND EMERGING ECONOMIES

This report is the eleventh edition of the OECD's Tax Administration Series. It provides internationally comparative data on aspects of tax systems and their administration in 58 advanced and emerging economies. The report is intended to inform and inspire tax administrations as they consider their future operations, as well as to provide information on global tax administration trends and performance for stakeholders and policy makers. The report is structured around nine chapters that examine the performance of tax administration systems, using an extensive data set and a variety of examples to highlight recent innovations and successful practices. This edition also contains an additional chapter that explores progress on the digital transformation of tax administrations. The underlying data for this report comes from the International Survey on Revenue Administration and the Inventory of Tax Technology Initiatives.