Increasing Domestic Resource Mobilization through the Digitalization of Tax Administrations in Asia and the Pacific

Progress, Challenges, and Opportunities

Alberto Isgut and Alfonso Pellegrino
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About the authors: Alberto Isgut is an Economic Affairs Officer at the Financing for Development Section of the Macroeconomic and Financing for Development Division of ESCAP. Alfonso Pellegrino is a researcher focused on consumer behavior and the impact of digital technologies on consumer behavior.

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Abstract

Amid high debt servicing costs, low fiscal space and major financial requirements to implement the Sustainable Development Goals, the digitalization of tax administrations has much potential to enhance tax compliance, expand the tax base and increase the efficiency and effectiveness of domestic resource mobilization. This paper describes five major digital taxation tools – e-filing, e-invoicing, e-withholding taxes, point of sale systems, and track and trace systems – in Asia and the Pacific. Because most of these digital tools are very recent and in early stages of development, the paper relies mostly on case study evidence on the adoption of these new tools by selected tax administrations in the region. Through the case study evidence, the paper identifies challenges to scale up digital solutions and opportunities to address them. The latter include the adoption of a comprehensive framework of data security and privacy to protect taxpayer information, training programs and public awareness campaigns, stakeholder engagement in the design of software solutions, and special consideration and policies to include informal businesses.

Keywords: Digitalization of tax administration, Asia and the Pacific, e-filing, e-invoicing, e-withholding taxes, point of sale systems, track and trace systems.

JEL classification: H2, L86.
1. Introduction

With developing countries in Asia and the Pacific facing high debt servicing costs, low fiscal space, and major financial requirements to implement the Sustainable Development Goals, enhancing tax revenues is of critical importance. The digitalization of tax administrations, which has made important progress in the region in the last decade, has potential to enhance tax compliance, expand the tax base and increase the efficiency and effectiveness of domestic resource mobilization at a time of significant fiscal challenges. The purpose of this paper is to describe five major digital tax tools (e-filing, e-invoicing, e-withholding taxes, POS systems, and track and trace systems), survey their progress in their implementation in selected countries and discuss the main challenges and opportunities for other countries to further the digitalization of their tax administrations.

Although digital solutions for tax administrations are not entirely new, progress in the implementation of such solutions accelerated during the COVID-19 pandemic, according to an OECD report based on a survey of 59 tax administrations from advanced and emerging economies (OECD, 2021b). The report found that electronic filing of tax returns and the electronic transfer of payments are becoming the norm, with over 90 per cent of business taxpayers and over 80 per cent of income tax return filers filing their returns electronically. The report also shows that more than 80 per cent of the tax administrations surveyed use data analytics tools and techniques to improve risk management and compliance, and that close to 75 per cent use cutting-edge techniques, such as artificial intelligence and machine learning, to support tax administration processes and services and free up human resources that can be deployed to other areas.

However, progress in the digitalization of tax administrations have been uneven across countries. According to an IMF report (Amaglobeli and others, 2023, p. 12), e-filing has become ubiquitous in advanced and emerging market economies, but low-income developing countries are lagging (figure 1, panel A). Interestingly, the report finds that the use of e-invoicing and electronic fiscal devices – further discussed in sections 3 and 5 below – are more prevalent in emerging market economies and low-income developing countries than in advanced economies (figure 1, panel B). In contrast, low-income developing countries and emerging market economies lag considerably behind advanced economies in the adoption of analytical tools such as machine learning and application programming interfaces to automatically exchange information across different systems.

1 The term digitalization denotes the use of digital technologies and data to transform and improve business processes. Digitization refers to the conversion of analog information into digital format, which is part of digitalization. Throughout this paper we use the term digitalization because the five tools analysed require changes in processes for their implementation, such as adding secure and efficient channels of communication between taxpayers and tax authorities to enable timely exchange of information, inquiries, and dispute resolutions (Addis Tax Initiative, 2023).
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Figure 1: Adoption of various digital tax administration tools by groups of countries in 2019

Panel A: Share of taxes e-filed by tax type

Panel B: Share of countries using e-invoicing and electronic fiscal devices


Notes: PIT = personal income tax, CIT = corporate income tax, VAT = value-added tax, EFD = electronic fiscal devices.

The impact of tax digitalization initiatives on tax revenue in developing countries is expected to be positive because a simplified tax process incentivizes voluntary compliance, resulting in a larger taxpayer base, reduced tax avoidance, and more effective use of scarce tax enforcement resources (Better than Cash Alliance, 2020, p. 19). As an example, Nepal implemented a comprehensive program to digitalize its tax administration since 1997, and by fiscal year 2014/15 98 per cent of tax filings and nearly 100 per cent of registrations were conducted online (Better than Cash Alliance, 2020, p. 17). The program resulted in a broadened tax base, with registrations to the personal income tax (PIT) increasing six-fold between fiscal years 2009/10 and 2015/16. Between fiscal years 2010/11 and 2014/15 the total number of PIT and value added tax (VAT) returns filed more than doubled, respectively, to 438,000 and 914,000 (Better than Cash Alliance, 2020, p. 19). Overall, the country’s tax-to-GDP ratio grew from 8.7 per cent in fiscal year 1999/2000 to 18.7 per cent in fiscal year 2015/16 (Better than Cash Alliance, 2020, p. 17).

The IMF report mentioned above summarizes the results of various econometric studies on the impact of digital tax administration tools and tax revenues (Amaglobeli and others, 2023, p. 13-14). One study estimates that the implementation of e-filing could lead to an increase in tax revenue of 3 percentage points of GDP, while the implementation of e-invoicing and electronic fiscal devices could increase tax revenues by, respectively, 0.7 per cent and 0.5 per cent of GDP. Other studies reviewed by the IMF report suggest that digitalization tools have a larger impact in increasing revenues from VAT and corporate income taxes (CIT), with one of them finding that the impact of e-filing on CIT revenues is twice that on PIT revenues. However, another growth and increased remittances on VAT revenues and various tax administration reforms that complemented the introduction of digital solutions. See Bolnick and Singh (2018).
study warns that the positive impact of digitalization on tax revenues depends on the country’s levels of digital connectivity and on the staffing and expertise of its tax officials.

The digitalization of tax administration contributes directly and indirectly to many targets of the 2030 Agenda for Sustainable Development. It contributes directly to Targets 17.1 (Strengthen domestic resource mobilization…to improve domestic capacity for tax and other revenue collection) and 16.6 (Develop effective, accountable, and transparent institutions at all levels). To take full advantage of digital tax solutions, it is important for countries to invest in ICT infrastructure and expand access to the Internet, thus contributing to Target 9.c (Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020).

In addition, the additional tax revenues that can be mobilized through the implementation of digital tax solutions can fund public programmes and investments to achieve many SDG targets. Examples include Targets 1.a (Ensure significant mobilization of resources from a variety of sources... to provide adequate and predictable means for developing countries... to implement programmes and policies to end poverty in all its dimensions), 3.8 (Achieve universal health coverage, including financial risk protection, access to quality essential healthcare services and access to safe, effective, quality and affordable essential medicines and vaccines for all), 4.1 (By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes), 6.1 (By 2030, achieve universal and equitable access to safe and affordable drinking water for all), and 15.a (Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems).

The purpose of this paper is to discuss how five ICT solutions – e-filing, e-invoicing, e-withholding taxes, POS systems, and track and trace systems – can bolster administrative efficiency, build trust between taxpayers and tax authorities, improve domestic resource mobilization and augment revenue collection. These five solutions, which are key tools for the digitalization of tax administrations in the region and beyond, are discussed in sections 2 to 6. Each of these sections introduces the tools and provides examples of implementation with a focus on the Asia-Pacific region and including a detailed case study. Section 7 summarizes the implementation challenges of the five tools in the developing countries of Asia and the Pacific, and section 8 discusses how to address these challenges.
2. E-filing

E-filing allows the submission of tax documents through online platforms. Such systems simplify tax filing, cut down errors, and offer cost-effective administrative solutions. They also allow for speedier tax refund processes, enhancing taxpayer trust and compliance. Given the region’s burgeoning middle class, rapid urbanization, and an expanding pool of digitally literate population, e-filing offers an efficient solution to expand the tax base.

Table 1 shows the average of the percentages of personal income tax (PIT) returns, corporate income tax (CIT) returns, and value added tax (VAT) returns that are filed electronically in 36 Asia-Pacific countries for which data was available in 2020. The table shows 15 countries that are top performers in e-filling, 11 countries with middle levels of development, three countries with incipient development and seven countries that have not started yet.

Table 1: Average of the percentages of personal income tax, corporate income tax and value added tax returns filed electronically in 2020

<table>
<thead>
<tr>
<th>Top performers (90 per cent or more)</th>
<th>Middle level of development (30 to 80 per cent)</th>
<th>Incipient development (under 20 per cent)</th>
<th>Have not started yet (0 per cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armenia (100)</td>
<td>Japan (76)</td>
<td>Bangladesh (13)</td>
<td>Vanuatu (0)</td>
</tr>
<tr>
<td>Georgia (100)</td>
<td>Thailand (73.3)</td>
<td>Hong Kong, China (12.5)</td>
<td>Brunei Darussalam (0)</td>
</tr>
<tr>
<td>Tajikistan (100)</td>
<td>Maldives (72.7)</td>
<td>Solomon Islands (2.5)</td>
<td>Timor-Leste (0)</td>
</tr>
<tr>
<td>Mongolia (100)</td>
<td>Uzbekistan (70)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nepal (100)</td>
<td>India (66.3)</td>
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<tr>
<td>Malaysia (99.5)</td>
<td>Cambodia (55.5)</td>
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<td>Pakistan (99.3)</td>
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<td>Republic of Korea (99)</td>
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<td>Viet Nam (98.3)</td>
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<td>Azerbaijan (97)</td>
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<td>Singapore (96.3)</td>
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<td>New Zealand (96)</td>
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<tr>
<td>Indonesia (96)</td>
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<td></td>
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<tr>
<td>Australia (93.7)</td>
<td></td>
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</tbody>
</table>


Notes: The values for Nauru, Nepal, Papua New Guinea, and Viet Nam are for FY 2019.
Figure 2 shows subregional e-filing averages for PIT, CIT, and VAT. On average, North and Central Asia has the highest rates of adoption of e-filing, followed by East and North-East Asia, South-East Asia and South and South-West Asia. The Pacific subregion has the lowest adoption rate. Except in South-East Asia, the adoption rate is highest for the CIT and lowest for the PIT.

The adoption of e-filing in the region seems to have accelerated in recent years. For example, the Directorate General of Taxes (DGT) of Indonesia, introduced an electronic application to submit the annual income tax return (SPT) in 2004, but ten years later the adoption rate was still very low. According to Lubis, Susilawaty and Lyantoc (2022, p. 193, table 2), the percentage of taxpayers using e-filing increased from 6 per cent in 2014 to 57 per cent in 2020.

During the same period, the rate of compliance by individual taxpayers increased from 67 per cent to 85 per cent for employees and from 23 per cent to 52 per cent for non-employees (Lubis, Susilawaty and Lyantoc, 2022, pp. 196-197).

As several studies have found, the correlation between the adoption of e-filing and tax compliance is not a coincidence. For instance, Saptono and others (2023, p. 17) found that the improvement in service quality and the perception of reduced compliance costs brought about by e-filing significantly predicts tax compliance intentions in a study of Indonesian tax professionals. A recent study of Vietnamese enterprises similarly found that the adoption of an e-tax system explains 38 per cent of a positive change of tax compliance (Ha and others, 2022, p. 55).

Figure 2: Percentages of personal income tax, corporate income tax and value added tax returns filed electronically in 2020, by subregion


Notes: The values for Nauru, Nepal, Papua New Guinea, and Viet Nam to construct the figure are for FY 2019.
CASE STUDY 1: INDIA - INNOVATIONS IN TAX E-FILING

The Income Tax Department of India introduced an e-filing system in September 2004, as a voluntary option, with the aim of streamlining the filing of central government and state-level taxes. In July 2006 e-filing became mandatory for corporate firms, and in June 2021 the system was upgraded through the introduction of a new portal. The new e-filing 2.0 portal was designed for enhanced user experience. It features a comprehensive dashboard for all taxpayer interactions, rapid processing of returns for expedited refunds, and free income tax return (ITR) preparation tools (Tax2win, 2023; The Nobroker Times, n.d.).

The e-filing 2.0 portal offers pre-filled ITR forms incorporating details like salary, interest, dividend income, and capital gains, which aim at reducing taxpayer burden and improving accuracy. This enhancement is coupled with an updated interface, available in multiple Indian languages and optimized for mobile use. The portal includes quick access links to essential services, a detailed help section with user manuals, FAQs, and videos, added functionalities for tax professionals, and a chatbot for instant guidance, and it provides diverse payment options, including credit cards or through United Payments Interface (UPI), India’s instant payment system (The Nobroker Times, n.d.).

Selected features

E-verification of returns – E-verification of ITR is the process of confirming the authenticity of the income tax return filed online by checking that the information reported by the taxpayer matches information about the taxpayer’s financial transactions reported to the Income Tax Department by financial institutions or other entities. The e-verification can be done through the e-filing portal, where the taxpayer has the option to report errors. The e-verification can be done through a mobile phone, where the taxpayer receives an electronic verification code, which must be entered in the e-filing portal (Income Tax India, n.d.). The period for e-verification submission post-filing was recently reduced from 120 days to 30 days (India Today, 2022).

AI and big data integration – In response to the need for quick and accurate data processing, AI and big data analytics were integrated into the taxation system. In the context of income tax returns, these tools can be used to prompt taxpayers about mismatches in their ITRs and transactions reported by other entities so that they can revise their returns. Data analytics techniques can also be used to flag high-risk cases from a tax evasion perspective (Data Dance, 2023).

Enhanced communication and assistance to taxpayers – Leveraging sophisticated algorithms, the system provides personalized communication to taxpayers. This includes sending reminders, notifications, and tailored tax planning advice based on individual income and deduction patterns. Enhancements in communication and assistance, such as dedicated helplines, live chat support, and email services, have been made to assist taxpayers during the e-filing process (TechWonders.com, 2023).

Outcomes

The introduction of the e-filing portal 2.0 had improved the efficiency of income tax administration in India. One outcome is the decrease in the processing time of returns. As of 31 January 2022, 22 per cent of the TIR for FY 2020-2021 were processed within 24 hours and 54 per cent were processed within two
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weeks (India: Integrated e-filing, n.d.), and taxpayers typically receive their income tax refund within three to six weeks (HDFC Sales, 2020). There has also been a marked reduction in filing errors. The percentage of defective tax returns out of total tax returns filed drop from 1.05 per cent in FY 2019-2020 to only 0.0025 per cent in FY 2020-2021 (India: Integrated e-filing, n.d.). This is related to the successful implementation of e-verification in the e-filing 2.0 portal, with 73 per cent of ITRs e-verified during FY 2020-2021. The e-filing 2.0 portal is also contributing to educating and empowering taxpayers by pro-actively engaging with them through digital media. For instance, between August 2021 and January 2022 taxpayers received more than 170 million emails and around 10 million SMS to keep them informed (India: Integrated e-filing, n.d.).

With regards to tax compliance, Vigg Kushwah, Nathani and Vigg (2021) found in a survey of large corporate taxpayers that both tax penalties and electronic filing have a statistically significant influence on the corporate taxpayers’ tax compliance. A recent study by Deloitte India (2023) based on a survey of tax professionals found that India’s improved income-tax portal was considered by corporations as one of the most effective digital tax administration initiatives based on its user-friendly interface and e-documentation trail maintenance. The study found that 92 per cent of businesses with a turnover of more than INR 6,400 crore (about $770 million) have significantly increased the usage of tax technology and 65 per cent of the respondents have already started witnessing a substantial change in their business operations through the adoption of digital tax initiatives. Timely filing is an important element of compliance. In this regard, the Income Tax Department announced that 67.7 million ITRs were filed by the 31 July deadline in 2023 compared to 58.3 million in 2022 (India, Ministry of Finance, 2023).
3. E-invoicing

Electronic invoices or e-invoices offer a more efficient alternative to traditional paper invoices. By eliminating manual data entry, they reduce the chances of human errors, improving accuracy. E-invoices can also be sent and received instantly, allowing businesses to process transactions more quickly and at a lower cost. In addition, e-invoicing systems can provide tax authorities with real-time or near real-time access to invoicing data. This enhances the efficiency of tax administration by ensuring that tax amounts are calculated and remitted correctly, and it facilitates tax compliance by generating reliable data for audits.

Based on the global experience, the Global Exchange Network Association (GENA, 2022) proposed four distinct models of e-invoicing:

**Interoperability model** – E-invoices from sellers to buyers are transmitted through specialized service providers that communicate in a standard language. In this model, tax authorities do not have access to e-invoicing data.

**Real-time reporting model** – E-invoices are submitted by the seller to a continuous transaction control (CTC) platform established by the tax administration agency for reporting purposes. The submission occurs typically 24 to 72 hours after the e-invoice is sent to the buyer.

**Clearance model** – E-invoices are submitted by the seller to a continuous transaction control platform established by the tax administration agency for clearance before they are sent to the receiver. The buyer also validates the e-invoice through the continuous transaction control platform before submitting the payment. This model was pioneered by Chile in 2004 (Rocha, 2022, p. 367) and adopted by other Latin American countries.

**Centralized exchange model** – In this model pioneered by Italy, the e-invoices are sent by the seller to the buyer through a continuous transaction control platform established by the tax authority.

To ensure compatibility and interoperability of electronic invoices across various systems and regions, numerous standards have been established. As an example, the Pan-European Public Procurement Online (Peppol) standard has been adopted by many European countries and Asia-Pacific countries such as Australia, Japan, New Zealand, and Singapore. In the case of the European Union, the adoption of common e-invoicing standards was motivated by the need to promote interoperability across public procurement agencies from different countries.4

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3 Continuous transaction controls (CTC) are a set of processes that enable law enforcement agencies, such as tax administrations, to view real time or near-real time financial data relating to business activity in their countries (Corcentric, n.d.).

4 Directive 2014/55/EU mandated these agencies to be able process electronic invoices automatically using a common standard by the end of 2018 (Koch, 2015, p. 19).
CASE STUDY 2: SINGAPORE - SUCCESSFUL IMPLEMENTATION OF THE PEPPOL E-INVOICING NETWORK

Singapore’s Infocomm Media Development Authority (IMDA) implemented a nationwide e-invoicing network in January 2019 to help businesses improve efficiency and reduce costs through faster digital payments. Priorly, in May 2018 IMDA became the first Peppol Authority outside of Europe. As part of the Peppol network, businesses in Singapore can transact internationally with other companies in the network. By January 2020, over 50 Peppol-certified service providers, referred to as Access Points, were already connected to the network and the Singapore government added a new channel for suppliers to submit e-invoices via a nationwide platform, which was renamed as InvoiceNow in September 2020 (IMDA, 2023a). InvoiceNow does not cover business to consumer (B2C) transactions (IMDA, 2023b). While InvoiceNow is currently voluntary, it is planned to become compulsory for business to government (B2G) e-invoicing (Caragher, 2023).

In the Peppol network, documents are exchanged using a common XML format. This allows sellers and buyers to process their e-invoices through their respective enterprise resources planning (ERP) platforms even if they are different. Documents are exchanged through Access Points, which translate e-invoices in various formats into a standard format for transmission over the Peppol network. Peppol 4-corner model works as follows: Regardless of invoice format, documents that are sent out by the seller (corner 1) will be converted into the common standard at its Access Point (corner 2). The global Peppol directory will provide the necessary information to corner 2 to identify the receiving Access Point (corner 3) for the e-invoice to be sent through the network. Upon receiving the e-invoice, corner 3 will map the e-invoice into the format used by the buyer (corner 4) (IMDA, 2023a). In figure 3, which illustrates the 4-corner model, the seller is labeled as the sender of the e-invoice and the buyer is labelled as the receiver of the e-invoice.

The Inland Revenue Authority of Singapore (IRAS) recently completed a pilot trial to test whether InvoiceNow can be upgraded to support GST tax compliance. The pilot found that can benefit businesses from an easier GST compliance, potentially fewer audits, and faster GST refunds. As a result, IRAS recently announced that it would work with IMDA, the Accountant-General’s Department and businesses to upgrade InvoiceNow so that it can support the administration of the Goods and Services Tax (GST) (IRAS, 2023). This could be achieved by upgrading InvoiceNow from its exiting 4-corner model to a 5-corner model (Caragher, 2023). A 5-corner model adds a regulatory segment, where the tax administration agency receives through a continuous transaction control platform copy of the e-invoices from both seller and buyer for tax compliance purposes (figure 4). This model is similar to the decentralized continuous transaction control exchange (DCTCE) model proposed by GENA (2022).

5 XML stands for extensible markup language. XML is commonly used for the interchange of data over the Internet. Differently from the hypertext markup language (HTML), which is used to format Web pages, XML is concerned with how information is organized (Roche, 2000).
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**Figure 3: Peppol 4-corner model**

Source: ESCAP.

**Figure 4: An example of a 5-corner with Peppol model**

Source: ESCAP based on Steve Graham, Peppol four-corner model, presentation at a webinar on e-invoicing for cross-border paperless trade co-organized by ESCAP, Peppol, ICC and ADB, 22 November 2022.

In 2022 Malaysia announced that, similarly to Singapore, it will set up a Peppol Authority and implement a 4-corner Peppol model. Malaysia Digital Economy Corporation (MDEC) will be Malaysia’s Peppol Authority responsible for the e-invoicing framework including registering Peppol Access Points in the country. MDEC recently signed a memorandum of understanding with the Inland Revenue Board of Malaysia (HASiL) to work together to coordinate the implementation of the National E-Invoice Initiative with the nationwide tax compliance model (Baulf, 2022). This will imply moving from the 4-Corner Peppol model to a decentralized “Continuous Transaction Controls” (CTC) model in future, possibly by adding a fifth corner to Peppol, as in figure 4 above.

**Selected implementation characteristics**

**Stakeholder engagement** – From 2015 to 2018, the Singaporean government engaged in consultations with industry stakeholders to understand their needs and potential challenges. These discussions were instrumental in customizing the Peppol network to Singapore’s unique business environment.
Public-private collaboration – IMDA played a critical role in partnering with private sector service providers to establish a robust and reliable Peppol-based e-Invoicing network. This collaboration was key to ensuring that the system was scalable and adaptable to future changes.

Gradual transition – Recognizing the challenges businesses might face in transitioning to a new system, the government opted for a phased approach. IMDA described InvoiceNow as a multi-year project with no hard deadline, indicating a gradual transition (IMDA, 2023b).

Capacity building – To bolster the uptake of InvoiceNow, training sessions and workshops for businesses were conducted. Xero, a cloud accounting small business platform, became an InvoiceNow Solution Provider in 2019, highlighting the emphasis on educating SMEs about the workings and advantages of e-invoicing (Lee, 2023).

Incentivization – The Singaporean government has offered various incentives to businesses to accelerate the adoption of e-invoicing. These include a SG$200 bonus to businesses that send 10 e-invoices within a year and a SG$30,000 grant to large organizations with a minimum of 200 business counterparties (suppliers and customers) that integrate InvoiceNow with their ERPs within 12 months (Lee, 2023).

SME focus – Most of the 50,000 organizations using InvoiceNow are small and medium-sized enterprises (IMDA, 2023b).

Other approaches

As noted above, Singapore’s initial motivation to adopt e-invoicing has been to help businesses improve efficiency and reduce costs through faster digital payments, while only recently considering its use to support the administration of the Singapore’s Goods and Services Tax. Other countries in Asia-Pacific, however, had implemented e-invoicing with the main goal of improving tax compliance. A case in point is the Republic of Korea’s electronic tax invoicing (ETI) system in 2010. The system follows the real-time reporting model of e-invoicing discussed above, with all e-invoices reported to the National Tax Service (NTS) within a day from the day of the issuance (Lee, 2016). The ETI system resulted in substantial savings in tax compliance costs and a significant reduction in the issuance of fraudulent tax invoices (Kim, 2023).

Another country in the region that has implemented e-invoicing to improve tax compliance is Uzbekistan. This country introduced a national e-invoicing platform called SoliqOnline in 2019, following the centralized exchange model briefly described above. In 2020 the platform became mandatory for businesses with an annual turnover of more than around $100,000 USD. Businesses must register on the platform to obtain an electronic signature from the State Tax Committee before they can create e-invoices using the platform. The e-invoices are generated in a standardized electronic format, which can be sent to customers via email or other electronic means. Once the customer receives the e-invoice, they must verify and approve it through the SoliqOnline platform. Payment for an e-invoice can be made through the platform or other payment systems. Finally, all e-invoices generated and received through the SoliqOnline platform are automatically recorded and stored in the system, allowing businesses to easily access and manage their invoicing records, as well as simplifying tax reporting and compliance (Vat Update, 2023).
4. E-withholding tax systems

An e-withholding tax system is a digital platform that facilitates the accurate and efficient collection of taxes through the synchronization of withholding and payment processes. It is designed to ensure compliance with tax regulations and streamline the tax collection process between employers and employees. The main characteristic of an e-withholding tax system is the integration of electronic mechanisms for recording and reporting tax withholdings. This includes the use of digital platforms, such as online portals or software applications, to capture and store information related to employee salaries, tax deductions, and remittances. These systems automate the calculation, withholding, and payment of taxes, reducing errors and improving transparency.

The adoption of e-withholding taxes around the world is relatively recent. In the United States, the Internal Revenue Service (IRS) launched an e-withholding tax system in 2017 to synchronize withholding and payments between employers and employees, and to ensure compliance with applicable tax laws. Germany's Federal Central Tax Office adopted an e-withholding tax systems in 2019 to digitize and automate the withholding and payment of taxes. In Asia and the Pacific, Australia, India, Japan, New Zealand, Republic of Korea, Singapore, and Thailand introduced e-withholding tax systems between 2017 and 2020.

CASE STUDY 3: AUSTRALIA’S SUCCESSFUL IMPLEMENTATION OF AN E-WITHHOLDING TAX SYSTEM.

In July 2018, the Australian Taxation Office (ATO) implemented an e-withholding tax system, the Single Touch Payroll (STP) system, to optimize revenue collection amid an increasingly globalized economy, the proliferation of digital transactions, and the expansion of the gig economy. Designed to streamline the payroll process, STP mandates real-time digital reporting of payroll information by employers to the Australian Taxation Office. The reporting was initially required to businesses with 20 or more employees, but from July 2019 it was broadened to encompass all employers (Australian Taxation Office, 2022a).

The ATO’s implementation of the STP system was collaborative, involving extensive consultations with industry representatives and stakeholders. This co-design strategy was crucial in developing solutions that catered to the varied needs of Australian businesses, particularly aiding those with limited digital

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6 The gig economy refers to a labor market characterized by the prevalence of short-term contracts or freelance work as opposed to permanent jobs. It involves a workforce that is employed on a task-specific basis, often characterized by flexibility and temporary engagements. This economy is facilitated by technology platforms that connect freelancers or independent contractors with customers or businesses seeking their services for specific projects or tasks. Examples include ridesharing services like Uber and Lyft, accommodation services like Airbnb, and various other platforms for freelancers like Upwork and Fiverr. See Forsyth (2020).
Increasing domestic resource mobilization through the digitalization of tax administrations in Asia and the Pacific

capabilities. For employers, STP simplified reporting by aligning it with their natural payroll processes, effectively eliminating the need for annual payment summaries and redundant reporting to various government agencies. This change not only enhanced the digital capabilities of employers, especially small businesses, but also significantly reduced their administrative burden.

In January 2022, the ATO started the implementation of STP Phase 2 (STP2), with the aim of reducing the burden of employers who need to report information about their employees to multiple government agencies, including Services Australia. The shared information will allow this agency, among other things, to (i) save time of customers by pre-filling claims and reports; (ii) reduce how often they'll need to contact customers; (iii) enhance Family Tax Benefit processes, and (iv) use STP information to improve the customer experience if a customer has debt to pay Australian Taxation Office, 2022a).

From an employee perspective, STP brought a new level of transparency, offering real-time insights into Pay as You Go (PAYG) withholdings and superannuation contributions. It also streamlined various onboarding tasks, such as Tax File Number declarations and super fund selections. For the Australian Taxation Office, STP became a critical tool to enhance the effectiveness of tax and super guarantee compliance. In the latter case, the ATO receives information on superannuation guarantee contributions from both businesses and superannuation funds. This allows ATO to cross check the information to detect irregularities and select businesses for audits or to issue penalties in cases of noncompliance (Eagles and Huynh, 2022).

STP also provided high-frequency labour market data, which facilitated policy analyses. For example, in April 2020 the Australian Bureau of Statistics (ABS) launched a new publication, Weekly Payroll Jobs and Wages, based on STP data (Australia Bureau of Statistics, n.d.), which was subsequently used to identify industries that have experienced a strong contraction or growth in jobs since the pandemic began in March 2020 (Gilfillan, n.d.).

**Selected implementation steps**

*Consultative planning and co-design* – The ATO embarked on a consultative planning process for both systems, recognizing the need to tailor them to the specific requirements of various stakeholders. This involved extensive consultations with businesses, individual taxpayers, IT professionals, tax practitioners, and industry representatives. For that purpose, an STP Advisory group was established, comprising key industry representatives, to shape and implement the initiative through collective knowledge, experience, and influence. This consultation facilitated a co-design of STP.

*Technological integration and software solutions* – A focus was placed on integrating the course of the year, the system makes it easier for employees to meet their taxation obligations (Mead Partners, 2016).

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7 Services Australia, one of the largest government agencies in Australia, delivers payments and services on behalf of government including social security and welfare, child support, and emergency and health programs (Services Australia, 2023).

8 Under a PAYG withholding system an employer withholds income tax from an employee or contractor’s salary or wages and pays the tax directly to the Australian Taxation Office on behalf of the employee or contractor. By allowing income tax to be paid by instalments through

9 In Australia, employers need to contribute a minimum of 11 per cent of employees’ pre-tax income to a superannuation (or super) account of their choice, which is known as the Superannuation Guarantee. These accounts are invested various financial assets which will financially support employees when they retire (Australian Super, n.d.).
STP with pre-existing financial platforms and digital tools. This strategy was crucial in enabling a seamless transition for businesses and individuals. For that purpose, the ATO called for expressions of interest by digital service providers to develop low or no-cost payroll or reporting solutions. This initiative highlights the importance of leveraging existing technological infrastructure to facilitate ease of use and adoption.

**Tailored pathways and transitional support** – Recognizing the varied digital capabilities among employers, particularly small and micro employers, the ATO provided tailored pathways and support. This included low/no-cost reporting solutions, simplified reporting requirements, and transitional relief through deferrals, exemptions, and quarterly reporting until 30 June 2021. These measures ensured that businesses with little or no digital capability were not left behind and could transition smoothly to the new system.

**Continuous monitoring, feedback, and external engagement** – Post-launch, the ATO established mechanisms for real-time monitoring and periodic feedback loops with stakeholders for both systems. This continuous engagement approach allowed for timely refinements and adaptations, ensuring the systems remained responsive and effective. To facilitate this approach, the ATO hosted annual engagement forums to reflect on the implementation and transition progress.

**Outcomes**

As of November 2023, there were over 300 commercially available software products that have met the Australian Taxation Office’s security requirements and are authorized to send STP data directly to the Australian Taxation Office (2023b). As of April 2023, there were over 679,000 employers, representing 78 per cent of the employer that report data to the ATO through STP, reporting Phase 2 data for 10.3 million employees (Australian Taxation Office, 2023c). In addition, the STP system’s infrastructure enabled the ATO to rapidly deliver stimulus measures during the COVID-19 pandemic, particularly through the JobKeeper program. 10 To implement this program, the ATO was able to set up the required systems in just six weeks, and most payments were issued within four days. Overall, the program disbursed AUD 89 billion to support over one million employers, and benefit over 4 million individuals.11

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10 The JobKeeper wage subsidy program aimed to ensure the viability of businesses through the period of shutdown of economic activity, provide financial support to households, and preserve connections between employers and their workforces. The program was originally set to last for six months, between March and September 2020, but it was subsequently extended for another six months (Borland and Hunt, 2023).

11 Based on an Australian Taxation Office’s presentation at an international conference on digitalization of taxes in Pakistan co-organized by ESCAP and Pakistan’s Federal Board of Revenue in 20-22 June 2023.
5. Point of sale systems

A point of sale (POS) system for tax collection purposes is a digital tool that facilitates the seamless and efficient collection of taxes at the point of sale. This system is widely used by businesses and governments to automate the tax collection process, ensuring accurate and real-time revenue collection. A POS system comprises devices, software, and payment services that merchants use for in-person sales, managing customer purchases, accepting payments, and providing receipts. Modern POS systems integrate with tax tools, enabling tax authorities to access transactional data, sometimes in real time.

POS systems include two types of devices, often called electronic fiscal devices, that gather and store sales data for tax compliance purpose by retail firms: electronic cash registers and online cash registers. Electronic cash registers are standalone physical devices that record sales transactions, calculate totals, and generate receipts. Equipped with built-in memory, display screens, keyboards, and receipt printers, they store transaction data locally and may have limited connectivity capabilities.

In contrast, online cash registers, also known as cloud-based or web-based POS systems, operate through internet connectivity and offer more advanced features than traditional electronic cash registers. They store and process transaction data remotely on secure servers that can be accessed via web browsers or dedicated software applications on various devices, including computers, tablets, or smartphones. Online cash registries offer a wider range of functionalities beyond simple sales transactions, such as inventory management, customer relationship management, sales analytics, and integrations with other business tools.

The use of POS systems for tax compliance disseminated across many countries in the mid- to late-2010s, particularly in South America (Argentina, Brazil, Chile, Ecuador, Peru) and Europe (Austria, Belgium, Czech Republic, Hungary, Italy, Latvia, Lithuania, Poland, Portugal, Romania, Slovakia, Slovenia, and Spain). In Asia and the Pacific, the Republic of Korea mandated the use of electronic fiscal cash registers and the daily transmission of data to the tax administration in 2015 (more details in the case study below), and India introduced a POS technology in 2016 to facilitate the real-time tracking of transactions and collection of the Goods and Services Tax (GST).¹²

¹² Kumar and others (2023) emphasized the role of cloud computing in GST implementation, highlighting its ability to handle tax evasion, compliance processes, and return filing, while Krishna and Jaiswal (2017) discussed how the GST regime is administered with the help of information technology, including the GSTN platform, which enables transparency in business dealings and provides a reliable IT backbone for the smooth functioning of the GST system.
CASE STUDY 4: REPUBLIC OF KOREA - INNOVATING TAX COLLECTION THROUGH POS INTEGRATION

The implementation of the POS tax system in the Republic of Korea is part of its broader digitalization of tax administration process that started with the launch of the Tax Integrated System, an integrated database that connects all district tax offices into a single network, in 1997 (Kim, 2022, p. 192). In 2005 the country’s National Tax Service implemented a POS system called e-cash receipt system to curb tax evasion associated with cash transactions, which accounted for about 61% of total private consumption in 2004, even after efforts to incentivize payments by credit and debit cards (Kim, 2022).

The e-cash receipt system operates through the participation of consumers, merchants, and e-cash receipt service providers (figure 5). Consumers pay for goods or services in cash at merchants and receive cash receipts in return. Merchants provide goods or services to consumers and issue cash receipts using a device installed by a cash receipt service provider at the merchant store.

The device assigns e-cash receipt approval numbers, while the cash receipt service providers are responsible for transmitting the cash receipt information issued by the merchants to the tax authorities (Kim, 2023).

To accelerate participation of consumers and merchants in the e-cash receipt system, the government provided incentives, including tax deductions for business operators based on the transaction amount and income deductions for consumers (Kim, 2023).

The implementation of the e-cash receipt system CRS resulted in a drastic increase in the number and value of cash receipts issued. In 2018, the value of cash receipts issued was KRW 116.4 trillion (approximately $97 billion), about 6.3 times higher than in 2005, while the number of cash receipts issued reached 45.3 billion (Kim, 2022). As such, the system has been evaluated as an unqualified success in curbing tax evasion by cash-based companies in the retail sector, although it caused prices in the retail industry to increase and some firms to exit the market (Lee and Swenson, 2017, p. 10).

Figure 5: E-cash receipt process flow

![E-cash receipt process flow diagram]

6. Track and trace systems

Track and trace systems allow the real-time monitoring and verification of products as they move through supply chains. With globalization and intricate transnational trade networks, ensuring the accurate levying of duties and taxes on goods has become increasingly challenging. Track and trace systems, as witnessed in the implementation in the European Union’s tobacco industry, offer a solution to this conundrum. These systems utilize unique product identifiers, allowing the tracking of individual items from manufacturer to final consumer. The captured data provides a transparent view into product movements, ensuring accurate taxation at each stage and deterring illicit trade practices.

One salient advantage of track and trace systems is the mitigation of tax evasion through illicit trade or counterfeit goods. The transparency offered by these systems ensures that goods are not only genuine but also that they adhere to the tax and duty structures in place. Furthermore, they bolster consumer trust, as end-users can independently verify the legitimacy of the products they purchase. Another significant advantage is the actionable intelligence provided to tax authorities. By offering granular insights into product movement and trade networks, authorities are better equipped to identify anomalies, streamline tax collection processes, and refine taxation policies based on real-world data.

CASE STUDY 5: PAKISTAN’S EFFECTIVE ADOPTION OF A TRACK AND TRACE SYSTEM FOR ENHANCED TAX COMPLIANCE

According to Pakistan’s Federal Board of Revenue (FBR), track and Trace involves the implementation of a robust, nationwide, electronic monitoring system of production volumes through affixing tax stamps in the form of barcodes on various products at the production stage that enable FBR to track the movement of goods throughout the supply chain (FBR, n.d.). Pakistan’s Track and Trace System (TTS) started to be rolled out in 2021 with the goals of covering the tobacco, cement, sugar, fertilizers, beverages, petroleum, oil and lubricants (POL) and steel sectors with the aim of enhancing tax revenue, reducing counterfeiting and preventing the smuggling of illicit goods (FBR, n.d.). In an initial phase, FBR implemented its TTS in three sectors: sugar, tobacco, and fertilizers (FBR, n.d.). The TTS was rolled out in the cement industry in August 2023 (Paracha, 2023).

Since its implementation, the TTS achieved three key objectives: increased transparency, improved tax compliance and reduction in the prevalence of counterfeit goods (FBR, n.d.). By digitally monitoring production volumes, the TTS increased transparency in the production data, reducing tax evasion through under-reporting. By making it easier for FBR to monitor the production of goods and identify potential tax evaders, the introduction of TTS resulted in increased tax compliance and
Increasing domestic resource mobilization through the digitalization of tax administrations in Asia and the Pacific

revenue collection. The system also made it more difficult for counterfeiters to produce and distribute counterfeit goods in the country, protecting consumers from potentially harmful products and legitimate businesses from unfair competition.

In the sugar sector the implementation of TTS started in November 2021 covering 79 sugar mills nationwide. Since then, no sugar bags were allowed to be removed from the factory premises and sold in the market without tax stamps (ProPakistani, 2022). This digital intervention has been considered successful in increasing sales and tax revenues. In the 2022 crushing season the sugar mills produced a record of 7.51 million tons, compared to 5.63 million tons in the previous crushing season. Similarly, FBR collected PKR 26.5 billion in sales taxes from the sugar sector during the first 4 months of operation of the TTS, between December 2021 and March 2022, compared to PKR 19.9 billion during the same period a year before, and increase of 33 per cent (ProPakistani, 2022).

In the case of the tobacco industry, the system covers both products manufactured in Pakistan and products imported into Pakistan and tracks them throughout the value chain till their exit point as they are purchased by the end-consumer (FBR, 2021). In view of the high tax evasion in the tobacco industry, estimated at PKR 70 billion in 2021 (FBR, 2021), the TTS shows promise to increase tax revenues. For this industry, the system was rolled out in July 2022 and initially implemented in three out of 40 companies (Business Recorder, 2022). However, as of the end of 2023, the prevalence of tax evasion, counterfeit, and smuggled cigarettes continued to be significant and called for stronger law enforcement measures (ProPakistani, 2023a), with the share of illicit trade representing 18 per cent of the total cigarette trade (Nasir, 2023). On this regard, the IMF (2023, p. 14) called for continued progress on the roll-out of track-and Trace to secure the full benefit of recent taxation changes, particularly federal excise duties (FED) on cigarettes.

In September 2023, an inquiry committee on the implementation of the TTS set up by the former Prime Minister proposed detailed recommendations to revamp the system in the cigarettes, sugar, cement, and fertilizer sectors (ProPakistani, 2023b). The recommendations include technical elements, such as customizing the mechanisms to affix tax stamps to the manufacturing processes of each sector, enforcing the mandate to register brands of products, and integrate e-invoicing with the TTS to improve transparency and reporting of tax invoices, as well as focused enforcement action against evaders. The report also recommended providing discounts or installments on applicator machines so as not to create a burden on the manufacturers, which is one of the major reasons for many of them not to implement the system.

13 The total tax evasion in 2021 was estimated at PKR 310 billion, representing 6 per cent of the GDP (Haq, 2021).
14 A case in point is the fertilizer industry, where numerous technical issues that have impeded the efficient operation of the TTS (Rizvi, 2023).
7. Challenges

The implementation of the digital solutions discussed in the previous section requires addressing a number of challenges. Table 2 provides a summary.

Table 2: Summary of challenges for the implementation of digital tax solutions

<table>
<thead>
<tr>
<th>Challenge</th>
<th>E-filing</th>
<th>E-invoicing</th>
<th>E-withholding taxes</th>
<th>POS systems</th>
<th>Track and trace systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Unreliable internet connectivity, insufficient bandwidth or unstable power supply</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2) Insufficient digital literacy of tax administrations’ staff and managers</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3) Insufficient digital literacy of individual taxpayers and small businesses</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4) Vulnerability to cybersecurity threats</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>5) Extent of the informal economy in developing countries</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>6) High costs for businesses associated with technology procurement, system integration, training, and maintenance</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>7) Need for user-friendly and effective IT systems and platforms</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8) Cultural resistance to transition from a familiar, traditional method to a new digital platform</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: ESCAP.
The challenges related to internet connectivity and digital literacy (challenges 1-3 in the table) in the Asia-Pacific region can be assessed with a broad indicator: The use of internet as a percentage of the population (figure 6). This indicator summarizes both supply side (availability of internet connectivity) and demand side (lack of digital literacy) factors.

The figure shows high levels of internet use in East and North-East Asia and North and Central Asia, followed by South-East Asia, the Pacific and South and South-West Asia. A low percentage of access to the internet is not an unsurmountable obstacle for the setup of the digital solutions discussed in this paper. In general, internet access is higher in urban areas, where tax administration and most businesses are located. However, even in areas with internet availability, the bandwidth might be insufficient for the effective operation of solutions such as e-invoicing, POS systems or track and trace systems, which require highly frequent real-time transfers of data from businesses to tax administration platforms. The largest ICT infrastructure challenges are in rural areas and in archipelagic countries, where access to internet connectivity may be intermittent. According to data by the International Telecommunications Union, 80.1 per cent of individuals used the internet in urban areas in 2023, compared with 52.3 per cent for individuals in rural areas.15

Figure 6: Individuals using the internet (percentage of the population)

Source: ESCAP based on data downloaded from World Development Indicators updated as of 26 October 2023.

Notes: Internet users are individuals who have used the Internet (from any location) in the last 3 months. The Internet can be used via a computer, mobile phone, personal digital assistant, games machine, digital TV etc. The data source is International Telecommunications Union. Numbers in parentheses are the average use of the internet by subregion.

As noted above, the data on internet use reveals not only the supply of internet services, which is related to the available ICT infrastructure, but also barriers related to the demand for internet services. Delaporte and Bahia (2021, p. 23) discuss five of such barriers. The first one is affordability, as the cost of devices, data plans or other service fees are unaffordable to low-income individuals in many countries. The second is knowledge and skills, as many people are unaware of mobile internet or its benefits or do not have the necessary skills to use digital technology. The third is relevance, when local digital ecosystems are underdeveloped and there is a lack of content, products and services that meet user needs and capabilities. Fourth is safety and security, a particularly important concern, when individuals and communities are concerned about negative effects and risks of the internet, such as harassment, theft, fraud, and inline security. And the fifth barrier, is access, when individuals do not have access to networks and enablers such as electricity and formal IDs, or when devices and services are not accessible enough.

To be sure, the five digital solutions for tax administrations discussed in this paper can still be implemented even if access to internet connectivity is not widespread among the population. However, expanding access over time will be an important objective both to gradually reduce the digital divide and, in the case of taxation, to contribute to an expansion of the tax base. In that regard, training tax officials, small businesses, and individuals to use digital tax solutions is particularly important.

With regards to cybersecurity (challenge 4 in the table), organizations in the Asia-Pacific region experienced 1,835 attacks per week in the first quarter of 2023, exceeding the global average of 1,248 attacks per week, and the average cost of each data breach in South-East Asia was estimated at over $3 million (Lim, 2023). A major challenge in the region is a lack of trained cybersecurity professionals, which leaves organizations unprepared for countering threats (Lim, 2023).

These threats are particularly important for tax administrations, given the large amount of confidential information in digital format they receive from individuals and businesses and the exchange of such information with other government agencies. While cybersecurity threats can arise from hackers, criminal organizations, or others outside the tax administration, they can also originate in officials with legitimate access to confidential tax data. To minimize the latter risks, it is important to ensure that tax officials only have access to the data needed for accomplishing their responsibilities and that tax administrations ICT systems have built-in capacities to monitor activity, so that any intentional or unintentional misuse of data can be traced (OECD, 2021a, annex D). Cybersecurity threats can also arise from software providers handling taxpayers’ confidential information.

The extent of the informal economy in the developing countries of Asia and the Pacific is another important challenge for the implementation of digital tax solutions (challenge 5 in the table). According to ILO (2018), more than 68 per cent of the employed population in Asia-Pacific are in the informal economy, representing 1.3 billion people or 65 per cent of the informally employed people in the world. Informal employment is predominant in rural areas (85 per cent of employment) and is almost half of employment (47 per cent) in urban areas. While almost all the agricultural employment (95 per cent) is informal in the region, it
represents a higher share in the industrial sector (69 per cent) than in the services sector (54 per cent). Informality is problematic because informal workers and businesses usually do not have access to conventional financial services, social security or the protection of the judicial system, which makes them highly vulnerable (Wirjo, Calizo and Balbontín, 2022).

The issue of taxation of the informal economy has been controversial. According to Joshi, Prichard and Heady (2014), critics have argued that the potential revenue yields are low, administrative costs are high, tax incidence is likely to be regressive, and tax enforcement could risk exposing vulnerable firms to harassment. However, recent research has pointed to potential benefits of informal sector taxation in terms of revenue, growth, and governance. With respect to revenue, the informal sector represents a large share of GDP, and thus a potentially significant source of tax revenue. Taxing the informal sector may also be essential to sustain “tax morale” and compliance among larger firms; and with respect to growth there is some evidence that formalization may accelerate growth for some informal sector firms. Finally, with respect to governance, new arguments have been made that the payment of taxes by firms in the informal economy may contribute to engage firms with the state, thus promoting legitimacy, good governance, and political accountability (Joshi, Prichard and Heady, 2014, p. 1325).

On an additional positive note, the expansion of the digital economy holds the potential to formalize certain activities, thereby creating new sources of tax revenue (Juswanto and Simms, 2017, p. 4). In this regard, the expansion of the peer-to-peer (P2P) economy for services such as ridesharing, retail sales, or travellers’ accommodation present an important opportunity for tax administrations to engage digital platforms through which these services are offered as withholding agents for the payment of taxes (Aslam and Shah 2017, pp. 28-29).

Although the implementation of digital tax initiatives such as e-invoicing and e-withholding taxes will result in lowering the costs of tax compliance for businesses, transitioning to digital tax systems involves upfront costs such as the procurement of necessary hardware and software, system integration, and staff training, as well as recurrent costs associated with software maintenance and updates (challenge 6 in the table). These costs can be significant for both large and small businesses. The former will already have up and running enterprise resources planning (ERP) platforms, to which they will need to integrate new system components to access the government digital tax platforms. This can be a complex, time-consuming and costly undertaking. While many small businesses may not have ERPs, in which case they will not face integration challenges, these businesses will face software, training, and possibly also hardware costs to access government tax platforms. Finally, the implementation of POS and track and trace systems requires businesses to invest in specialized devices, which can be costly, especially for small firms. In the case of track and trace, the integration of devices to affix tax stamps into manufacturing operations can imply additional costs.

A major challenge in the implementation of digital tax systems is the complexity and user-unfriendliness often associated with IT systems and platforms, which can discourage the use of digital tax platforms (challenge 7 in the table). This is important because, in general, citizens that consider government platforms to be helpful and user-friendly are
more likely to view their government as transparent and responsive. The perception that such platforms provide a direct and credible source of governmental communication and guidelines can help build trust in government and influence citizen compliance with regulations (Kolosky, 2023). This trust can be enhanced if the platforms facilitate two-way communication between the government and its citizens, allowing the latter to provide feedback, creating an open dialogue where citizens feel heard and involved.

A final challenge to the successful implementation of digital tax platforms is cultural resistance to change (challenge 8 in the table), as many individuals and businesses are accustomed to familiar methods of tax filing and administration methods. This reluctance is rooted in several factors, such as a lack of understanding of digital systems, concerns about data security and privacy, and fear of the complexities associated with new technology. Overcoming this barrier requires a multifaceted approach that includes educational initiatives to demystify digital platforms, reassurances about security measures, and offering support during the transition. Additionally, a gradual shift, where digital and traditional methods coexist, can help ease the transition and build confidence in the new systems.
8. Opportunities

This section discusses opportunities for tax administrations in the region to address each of the challenges to the implementation of digital tax solutions discussed in the previous section.

1) **Unreliable internet connectivity, insufficient bandwidth or unstable power supply**

To overcome these challenges, governments could promote the upgrade and expand the internet infrastructure through investments in broadband technologies, with a focus on covering rural and remote areas and bridging the digital divide. For this purpose, satellite or wireless internet solutions can be leveraged to reach areas where wired broadband is impractical. Collaboration with private sector entities, especially telecommunications companies, can facilitate these investments by combining public objectives with private expertise and resources. Regarding power supply, it is necessary to invest in reliable and sustainable power solutions. Given global commitments to climate action, the development of renewable energy sources such as solar power and wind power need to be prioritized. Such energy sources are also suitable to provide electricity in rural and remote areas, thus complementing the proposed investments in internet connectivity mentioned above. Complementary investments in electricity grids and advanced battery storage systems can also contribute to ensuring uninterrupted operation of digital tax systems. These investments can not only enhance the robustness and reliability of digital tax infrastructure but also play a significant role in building taxpayer confidence in the system. Ensuring consistent access to digital tax services irrespective of geographical location is key to promoting wider adoption and compliance, thereby making the tax system more inclusive and equitable.

2) **Insufficient digital literacy of tax administrations’ staff and managers**

To bridge the digital literacy gap among tax officials, tax administrations can implement training programs designed to cover a broad spectrum of digital skills, from basic computer literacy to more advanced topics like data analysis, cybersecurity, and the use of specific tax software. Acknowledging that different roles may require different levels and types of digital expertise, tailoring these training programs to various user profiles within the tax administration is key. Collaborations with educational institutions and technology firms can provide access to specialized knowledge and resources, enhancing the quality and relevance of training. Such partnerships can also facilitate the development of customized training modules that are directly aligned with the specific needs and systems used in tax administration.

In addition to formal training, creating a culture of continuous learning and adaptation is crucial. This can be achieved through regular workshops, webinars, and peer-learning opportunities, encouraging staff to stay abreast
of the latest digital trends and tools. Mentoring and support systems can also be established, providing staff with ongoing guidance and assistance as they navigate new digital platforms.

3) **Insufficient digital literacy of individual taxpayers and small businesses**

To enhance digital literacy among individual taxpayers and small businesses, a multifaceted strategy encompassing education, support, and incentivization is needed. Governments could provide tailored educational resources and training programs, particularly for small businesses. These programs need to cover essential digital skills for using tax software, including digital security and data entry. Collaboration with technology companies and industry experts can be useful for developing user-friendly guides, tutorials, and online courses. Additionally, creating forums for peer learning can foster a community of mutual assistance, enhancing digital competency in a collaborative environment. Incentives like tax breaks and expedited processing for digital filers could motivate businesses to improve their digital literacy and adopt new systems. Implementing pilot programs in specific sectors can help test and refine digital tax platforms, providing insights for broader implementation and building confidence among the business community.

Addressing the challenge of digital literacy also requires concerted public awareness campaigns, comprehensive training materials, and robust support services. Public awareness campaigns should effectively communicate the benefits and ease of use of digital tax platforms, using various media channels to reach a broad audience. Training materials, including step-by-step guides and interactive tools, should cater to different digital proficiency levels, making digital tax systems more accessible. Finally, support services like helplines, online chat support, and in-person assistance centers can be made available. These services, staffed by trained personnel, can offer personalized assistance, ensuring that taxpayers receive the help they need to confidently navigate digital tax platforms.

4) **Vulnerability to cybersecurity threats**

To address this challenge, governments need to design and implement a consistent and comprehensive framework of data security and privacy to protect taxpayer information including both technical and managerial elements. Such framework should cover both the physical protection of servers, workstations and networks and the establishment of clear guidelines for data privacy and security among staff and managers of tax administrations (OECD, 2021a, p. 73).

The framework should include technical solutions such as the implementation of advanced encryption techniques to protect data during transmission and storage. Encryption acts as a fundamental barrier, deterring unauthorized access and ensuring that data remains secure even if a system is compromised. Regular security audits are equally important, enabling tax authorities to identify and rectify vulnerabilities proactively. These audits should be thorough, covering all aspects of the digital tax system, including software, hardware, and network infrastructure. Another key aspect is to ensure that data centers, which are the backbone of digital tax systems, have the capacity to handle large volumes of data securely, maintain functionality during high-demand periods, and have redundancy and disaster recovery plans to ensure system resilience and continuity in the event of cyber incidents.
Training and awareness campaigns that clearly communicate the importance of data security and privacy and the actions taken by the government to protect them are fundamental to ensure engagement and support to digital tax solutions by not only staff and managers of tax administrations but also other government officials and the public at large. It is particularly important that taxpayers feel confident that all information is going to be securely stored and only made available as established in the country’s legislation (OECD, 2021a, p. 73).

Protection from cybersecurity risks also requires the engagement of service providers that handle taxpayers’ confidential information. For that purpose, tax administrations establish standards they must adhere to. For example, the Australian Tax Office developed a Digital Service Provider (DSP) Operational Security Framework (OSF) to protect taxation, accounting, payroll, business registry and superannuation data, as well as the integrity of various government computer systems (Australian Taxation Office, 2023a). The framework establishes a minimum level of security that DSPs need to meet to access ATO digital services. The DSP OSF aims to protect taxpayers and the ATO from security risks such as information misuse (including identity theft, personal gain, or commercial advantage), financial system misuse (including tax refund fraud), and destructive cyber behavior (including individual or system hacks).

Another example is the Peppol standard discussed above, which standardizes the exchange of procurement documents and data through a secure network of approved service providers, known as Access Points, enabling businesses to efficiently exchange invoices and other documents with registered trading partners. To ensure that Access Points provide quality service, Peppol requires them to adopt ISO 27001 standard developed by the International Organization for Standards. Having an ISO 27001 certification means that an organization follows the best practices and principles relating to securing the data it owns or handles (Lastiri, 2023).

**5) Extent of the informal economy in developing countries**

A popular view of tax compliance by informal firms is that these firms choose to remain informal if the costs of formalizing exceed the benefits. Costs include the cost of registration or getting licenses, the cost of tax compliance, and the cost of following labor laws and other regulations. Benefits include access to credit and capital markets, government procurement contracts, other external markets, and state-provided services and facilities. The benefits may also include a reduced need to pay bribes, provide free services, or relocate or shut down to avoid taxes (Joshi, Prichard and Heady, 2014, p. 1334). The implication of this approach is that policies that lower the costs and or increase the benefits could encourage voluntary formalization, including compliance with tax regulations. However, policies that focus exclusively on reducing the costs of formalization, such as simplified business registration, have been insufficient as they neglect the need for proactive support for small firms (Joshi, Prichard and Heady, 2014, p. 1335).

An alternative of informality considers that even if firms are aware of the potential benefits of formalization, they remain informal because of lack of capacities, distrust in government, and lack of easy access to services such as information,accountancy, security, justice, and insurance. The policy implications of this view are (i) a need to adapt tax regimes to the
characteristics of informal firms and (ii) to supplement business environment reform policies such as reducing the costs of registration with other supplementary policies such as securing property rights, improving security (safety from theft or harassment), establishing dispute resolution mechanisms, and affordable accountancy services (Joshi, Prichard and Heady, 2014, p. 1336).

In addition to the general policies to encourage formalization discussed above, tax administrations could establish separate departments to deal with small businesses, including those in the informal sector, to be able to provide services targeted to the needs and realities of such firms and ensure adequate incentives for tax administrators to focus on these firms despite potentially low revenue yields (Joshi, Prichard and Healy, 2014, p. 1339). A broader approach to encourage voluntary registration and tax compliance by small informal businesses is to earmark local level public expenditures as a way to build stronger trust among taxpayers by delivering well-defined benefits (Joshi, Prichard and Healy, 2014, p. 1340).

6) **High costs for businesses associated with technology procurement, system integration, training, and maintenance**

Addressing the high costs associated with technology procurement, system integration, training, and maintenance for businesses adopting digital tax systems requires a multifaceted approach. To ease the financial burden on businesses, especially small businesses, governments can consider offering tax deductions or tax credits to defray a portion of the costs of training employees and acquiring necessary software and hardware for digital tax compliance. The Australian Tax Administration, for instance, offers a bonus tax deduction of expenditures incurred in training to employees of small businesses with an aggregated annual turnover of less than AUD 50 million (Australian Taxation Office, 2023d). The ATO also offers the same bonus tax deduction to the same category of businesses for expenditures related to business digital operations, including portable payment devices, cyber security systems or subscriptions to cloud based services (Australian Taxation Office, 2023d).

In addition to financial incentives, providing comprehensive resources and support is crucial for system integration and maintenance. In this regard, the ATO offers information on a range of software solutions suitable for businesses of various sizes for the implementation of its Single Touch Payroll (STP) system (Australian Taxation Office, 2023e), helping businesses choose a solution that fits their needs and potentially reducing the costs and complexity of system integration. In addition, the ATO website provides detailed guidelines and resources to assist businesses in understanding and implementing the STP system, potentially reducing businesses’ need for extensive external training and support.

7) **Need for user-friendly and effective IT systems and platforms**

To address the need for user-friendly and effective IT systems in tax administration, a comprehensive approach centered on user-centric design and continuous improvement can be considered. Digital tax platforms should be designed with intuitive interfaces, ensuring ease of navigation and accessibility for all users, including those with disabilities. Incorporating features like real-time data exchange enhances the taxpayers’ experience by providing instant access to up-to-date information they require to report their taxes accurately.
Involving end-users in the design and development of these platforms is critical. Collaborative workshops and feedback sessions can yield valuable insights, leading to platforms that effectively meet user needs and adapt to changing tax regulations. Establishing stakeholder panels for ongoing input and driving innovation is also beneficial. Regular evaluations of system performance and user satisfaction, coupled with timely updates, ensure the platforms remain relevant and technologically advanced, continually meeting the evolving needs of users.

8) Cultural resistance to transition from a familiar, traditional method to a new digital platform

To address this challenge, governments should consider launching comprehensive awareness and education campaigns, using various communication channels to effectively reach different segments of the population. These campaigns should focus on benefits of digital tax platforms, such as enhanced efficiency, accuracy, and convenience. As noted above, adopting a user-centric design for these platforms, ensuring they are intuitive and incorporate elements from traditional methods, can make the transition less daunting. Additionally, providing robust support and training through workshops, tutorials, and helplines will assist users in adapting to the new systems. In addition, implementing digital platforms gradually, alongside traditional systems, allows users to become comfortable with digital methods at their own pace. Setting up mechanisms for engagement and feedback, such as surveys and focus groups, can also help in fostering a sense of inclusion and ownership among users. By understanding their concerns and adapting the systems accordingly, trust and acceptance of the digital platforms can be built, ultimately overcoming the resistance to change.
9. Conclusion

This paper provided an overview of five major digital tax tools – e-filing, e-invoicing, e-withholding taxes, POS systems, and track and trace systems – and details of their implementation in five countries of the region: India, Singapore, Australia, Republic of Korea and Pakistan. Based on these experiences and a review of the literature, the paper then discussed key challenges that tax administrations need to overcome to implement such systems and suggested opportunities to address such challenges.

With the exception of e-filing, which was adopted by many countries in the region, these digital tools are very recent and in early stages of development. As such, the paper relied mostly on case study evidence to provide information on how some tax administrations in the region have adopted these new tools. The case study evidence provides some useful lessons that could be considered by tax administrations in the region interested in these tools.

India’s experience with e-filing highlights the importance of a user-friendly platform design to facilitate taxpayers’ compliance and the effectiveness of the system in expediting the processing time of income tax returns and substantially reducing filing errors. Singapore’s experience illustrates the adoption of the Peppol e-invoicing standard. While Singapore’s system has been set up with the objective of improving business efficiency, the tax administration recently announced a plan to upgrade the system to support the administration of the Goods and Services Tax (GST). In contrast to Singapore, other countries of the region such as Republic of Korea and Uzbekistan implemented e-invoicing systems connected to a continuous transaction control platform established by the tax authority to collect real-time or near real-time e-invoice data as a tax compliance tool.

Australia’s implementation of an e-withholding tax system provides useful lessons on how to engage all relevant stakeholders in a collaborative process to design the best software solutions for the system. It also illustrates how the system’s design can evolve over time to address other needs, such as expanding the data collected from taxpayers to share it with other government agencies, or to provide an adaptable solution for the implementation of emergency cash transfers during the COVID-19 pandemic. The Republic of Korea’s experience with its POS system demonstrated its effectiveness in curbing tax evasion through cash transactions. Pakistan’s experience with its track and trace system highlights the complexity and industry-specificity of this solution, with significant increases in reported sales and tax revenues in the sugar industry but an uneven adoption by producers in the tobacco industry.

The implementation and scaling up of the digital tax solutions discussed in this paper is subject to many challenges. Two of them, insufficient
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digital literacy of tax administrations’ staff and managers and vulnerability to cybersecurity threats, should be considered as a high priority in tax administrations interested in implementing digital tools. Although other challenges, such as unreliable internet connectivity, insufficient bandwidth or unstable power supply which often characterize rural and remote areas of developing countries, insufficient digital literacy of individual taxpayers and small businesses, and the extent of the informal economy in developing countries are structural and broader, they are not less important and need to be addressed as well. The remaining challenges (high costs for businesses associated with technology procurement, system integration, training, and maintenance; need for user-friendly and effective IT systems and platforms; and cultural resistance to transition from a familiar, traditional method to a new digital platform) need to be addressed to ensure the buy-in of new digital tax solutions by taxpayers.

The paper suggests a wide range of opportunities to address these challenges, including a consistent and comprehensive framework of data security and privacy to protect taxpayer information, training programs and public awareness campaigns, financial incentives, stakeholder engagement for the design of software solutions, a focus on service quality, and special consideration and policies to include informal businesses.

Overall, the implementation of digital tax solutions offers great promise to improve tax compliance and expand the tax base, resulting in increased tax revenues. If accompanied by appropriate policies, these solutions can enhance voluntary tax compliance and facilitate an increased formalization of informal sector businesses. While the promise of these systems is encouraging, their implementation challenges are many. To accelerate progress, regional cooperation in the form of exchanges of experiences among tax administrations in the region, accompanied by the provision of technical assistance programs by specialized agencies and international organizations could be helpful. Additional research on the effectiveness of various policies could also be useful to guide tax administrations of the region in their tax digitalization journeys.


_________ (2022b). Single Touch Payroll Phase 1 employer reporting guidelines, 3 April.


_________ (2023d). Small business technology investment boost and skills and training boost, 5 July.


Business Recorder (2022). Only 3 tobacco companies have track & trace system, 27 July.


Data Dance (2023). Revolutionizing taxation: how India uses AI & ML to improve the tax process, 10 April.


Deloitte India (2023). Income-tax digitalisation in India – India Inc. is embracing tax technology under the government’s new-age tax administration: Deloitte India survey. Press release, 9 May.


Graham, Steve (2022). Peppol four-corner model, presentation at webinar on e-invoicing for cross-border paperless trade co-organized by ESCAP.


HDFC Sales (2020). 7 significant benefits of e-filing income tax returns in India, 4 December.


India, Ministry of Finance (2023). New record of over 6.77 crore income tax returns (ITRs) filed till 31st July, 2023; record growth of 16.1% year-on-year. Press release, 1 August.

India Today (2022). New rules to e-verify ITR, 4 August.

Infocomm Media Development Authority (IMDA) (2023a). About the nationwide e-invoicing initiative—updated, 3 August.


International Labour Organization (ILO) (2018). More than 68 per cent of the employed population in Asia-Pacific are in the informal economy, 2 May.


Kumar, Rakesh, and others (2023). Role of cloud computing in goods and services tax (GST) and future application. 2023 International Conference on Sustainable Computing and Data Communication Systems (ICSCDS).


Lim, Gary (2023). The 3 most common cybersecurity challenges faced by companies in Asia. Tech in Asia, 20 October.


Nasir, Jehangir (2023). Track and trace system proposed as solution to tackle 18% illicit cigarette trade in Pakistan. ProPakistani, 23 May.


__________ (2021b). Tax administrations continue to accelerate their digital transformation, 15 September.

Pakistan, Federal Board of Revenue (FBR) (2021). Minister for Finance and Revenue inaugurates track and trace system of FBR at Jehlum, 1 October.


ProPakistani (2022). Fbr registers 33% growth in sales tax from sugar sector through track & trace system, 27 March.

__________ (2023a). Enforcement of track and trace system pivotal to curbing illicit tobacco trade, 8 November.

__________ (2023b). Inquiry Committee on Track and Trace System proposes several improvements, 7 September.


Tech-Wonders.com (2023). The role of technology in streamlining e-filing of income tax returns in India, July.


