



The Benefits of Electronic Tax Administration in Developing Economies: A Korean Case Study and Discussion of Key Challenges

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Preface

This research paper is intended to inform and guide senior finance and tax administration officials from developing economies by providing context and direction for their journey through modernization and e-tax administration to improved taxpayer service and compliance. World Bank staff working on tax administration reform projects will also find this paper a useful reference. It includes discussion of key drivers and provides a detailed case study reviewing the Korean experience of creating a tax compliance environment in a situation very similar to that facing most developing economies today. The National Tax Service (NTS) of the Republic of Korea, starting in the late 1990s to the present, moved to an e-tax system, achieving dramatic improvements in tax compliance while bringing down administrative and compliance costs. The case study is followed by a summary of how the Korean transition process can illuminate the central challenges facing developing tax institutions and a review of the authors' experiences with other tax modernization programs in developing economies.

While some of Korea's experiences may not be directly relevant to those of other developing countries with low overall information technology capacity, the Maturity Model explored in this paper can help them self-assess their positions and choose relevant lessons suitable for their contexts.

This paper focuses on the fundamentals of creating an integrated ICT tax management solution (ITMS) for developing countries' tax administrations and the importance of ITMS to tax compliance and enforcement. This paper can serve as a guide to developing countries facing the challenges of creating sound e-tax administration systems to leverage advanced technologies. It does *not* cover the impact of new and emerging disruptive technologies, such as blockchain, artificial intelligence, and others, and how tax authorities can proactively embrace those changes. Those developments await future research and analysis.

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Abbreviations and Acronyms

| | |
|-------|---|
| ARS | automatic response system |
| ASMTD | Act on the Submission and Management of Taxation Data |
| ASP | application service provider |
| B2B | business-to-business |
| B2C | business-to-customer |
| BCN | Broadband Convergence Network |
| BI | business intelligence |
| BPR | business process re-engineering |
| COTS | commercial off-the-shelf |
| CR | cash register |
| EBPP | electronic bill presentment and payment |
| EDI | Electronic Data Interchange |
| EID | eligible income deductions |
| ERP | enterprise resource planning |
| ETCR | electronically traceable cash receipt |
| ETI | electronic tax invoice |
| ETP | electronically traceable payment |
| EWS | early-warning system |
| FAEC | Framework Act on Electronic Commerce |
| FANT | Framework Act on National Taxes |
| FIU | financial intelligence unit |
| FTA | Forum on Tax Administration |
| G4C | government-for-citizens |
| HIES | Household Income and Expenditure Survey |
| HTS | HomeTax Service |
| IaaS | infrastructure as a service |
| ICT | information and communications technology |
| ITIL | information technology infrastructure library |
| ITMS | integrated ICT tax management solution |
| KDI | Korean Development Institute |
| KEC | Korea Electronic Data Interchange for Administration, Commerce, and Transport Committee |
| KFTC | Korea Financial Telecommunications and Clearings Institute |
| KIEC | Korea Institute for Electronic Commerce |
| KNTS | Korean National Tax Simulator |

| | |
|-------|---|
| KRW | Korean won |
| MoFE | Ministry of Finance and Economy (reorganized as Ministry of Strategy and Finance in 2008) |
| MoSF | Ministry of Strategy and Finance (renamed as Ministry of Economy and Finance in 2018) |
| NTIS | Next-Generation Tax Integration System |
| NTS | National Tax Service |
| OCR | optical character reader |
| PaaS | platform as a service |
| PG | payment gateway |
| PIT | personal income tax |
| PIU | project implementation unit |
| PPS | Public Procurement Service |
| SaaS | software as a service |
| SSO | single sign-on |
| TIETP | tax incentives for electronically traceable payments |
| TIMS | Tax Information Management System |
| TIS | tax integrated system |
| TLI | total labor income |
| VAT | value-added tax |



Executive Summary

To collect sustainable tax revenue, modern governments must promote a culture of voluntary tax compliance, and this requires effective, reliable, and trusted tax administrations. A tax compliance culture can be developed through taxpayer education, enhanced taxpayer service (such as self-service options and simplified filing and reporting processes), and responsible enforcement and compliance programs that reinforce the need to comply. Electronic tax administration leverages the capabilities of modern integrated ICT tax management solutions (ITMSs), which encourages voluntary tax compliance by providing the data necessary to support enforcement and compliance programs and by providing electronic services that simplify taxpayer service and compliance.

Developing countries have an even more urgent need to use ITMS solutions because their shadow economies tend to be large compared to developed economies; ITMS helps identify and reduce a shadow economy. Because technological readiness is likely to be lower in developing countries, however, integrating the use of technology becomes a crucial factor in successfully implementing ITMS solutions. A lower shadow-to-GDP ratio leads to an improved tax-to-GDP ratio.

The authors employ the Capability and Maturity Model outlined in Table 1 to assess the e-tax administration. The model can help assess tax system maturity and aid strategic planning by evaluating the broad spectrum of challenges facing tax administration modernization initiatives. Table 1 provides an overview of the model with examples for each technical domain.

This report presents a case study drawn from the tax modernization efforts in the Republic of Korea, covering its key steps and achievements. Results in Korea demonstrate that using information and communications technology (ICT) solutions to tackle the shadow economy's persistent challenge and to increase tax compliance can lead to significant positive change. Korea's level of development and the maturity of its tax administration at the time the reforms were initiated in the 1990s was similar to that of most developing countries today, making lessons drawn from its experience widely applicable today.

The government of Korea began introducing computer systems to automate tax administration work processes in 1967, a year after the Korean National Tax Service (NTS) system was founded. In the early stages, however, NTS made only traditional use of information technology, automating routine workflow processes to input tax assessments, payments, and accounting data and issue tax notices in OCR (optical character reader) form. Full-fledged implementation of e-tax administration began in 1997 with the tax integrated system (TIS), which provided integrated information services across the tax service. The TIS initiative was intended to support two important tax policies: "prohibition of

TABLE 1 | Capability and Maturity Model

| | Stage 1 | Stage 2 | Stage 3 |
|--|---|---|--|
| Maturity of taxpayer compliance culture | <ul style="list-style-type: none"> Accounting practices are weak, proper books and records are not kept. | <ul style="list-style-type: none"> Books and records are generally available but underreporting of cash sales is common (second set of books). | <ul style="list-style-type: none"> Books and records are available, most often in electronic form, and cash underreporting is minimal. |
| Taxpayer e-service literacy and capability | <ul style="list-style-type: none"> Low computer literacy prevails among business owners. | <ul style="list-style-type: none"> The majority of businesses use computers and the Internet to support their businesses. | <ul style="list-style-type: none"> Businesses have fully adapted to electronic means for B2B, B2C, and data sharing with authorities. |
| Maturity of e-tax legal framework and overall legal framework | <ul style="list-style-type: none"> No legislation supports e-transactions or electronic signatures. | <ul style="list-style-type: none"> Case law supports the authenticity needs of e-transactions for tax filing, payments, and so on. | <ul style="list-style-type: none"> Legislation is in place to support electronic signatures and other authentication needs for government services. |
| Tax administration institutional maturity and capability | <ul style="list-style-type: none"> Tax administration split across more than one department and/or is organized by tax. | <ul style="list-style-type: none"> Tax administration is organized by function and has partially harmonized operations. | <ul style="list-style-type: none"> A fully functional model is in place, and audit and collection activities consider all tax types in case selections. |
| ICT implementation and sustainability capability | <ul style="list-style-type: none"> High-speed Internet in towns and cities is not sufficiently reliable to support e-services. Little or no e-services are offered in the country. | <ul style="list-style-type: none"> High-speed Internet has reached sufficient penetration in urban areas to include the majority of businesses, and some e-services are already in place in public and/or private sectors. | <ul style="list-style-type: none"> High-speed Internet is broadly available in all but the most remote areas. E-services are common. |

pseudo names and mandatory use of real names for bank account” (1993) and “global income taxation on aggregate financial incomes” (1996). To support global income taxation on financial incomes, NTS had to collect and analyze massive financial income data for each taxpayer. It conducted the feasibility study on TIS, and between 1994 and 1996, built an implementation plan. TIS was designed to increase efficiency in everyday tax administration work processes and to strengthen NTS’s ability to enforce tax compliance in line with changing tax policies. In 1995, the government of Korea enacted the Framework Act on Informatization Promotion and announced the national ICT strategy, the National Informatization Promotion Plan: Small but Efficient Government, in 1996. NTS therefore benefited from the national ICT infrastructure and other nationwide e-government initiatives.

In 1999, after introducing TIS, NTS began comprehensive organizational reforms that transformed the tax management system from a regional- to a functional-based tax administration. The new system improved the administration’s professionalism and efficiency through division of labor. Moreover,

eliminating personal relations between tax officials and taxpayers helped reduce the possibility of corruption, contributing to transparency. Because TIS computerized most tax administrative tasks, however, stakeholders unfamiliar with computerized work disliked the change. The strongest, most direct opposition came from officials responsible for filing and paying taxes at the endpoint of functionalized tasks. These officials had to manually insert tax return data submitted by taxpayers into a terminal connected to the TIS, which was monotonous tax collection work repeated nearly every day.

Realizing that an Internet-connected electronic filing system was the best option for resolving these problems, NTS in turn developed and launched HomeTax Service (HTS) in 2002, allowing taxpayers to file, report, and pay various taxes, including value-added tax (VAT) and income taxes, from home or work through the Internet. Furthermore, HTS enabled electronic notices for taxpayers and issuing tax-related documents online. With HTS networking TIS and taxpayers, tax administration efficiency improved, and service quality achieved higher standards, reducing the costs of tax compliance and improving taxpayer satisfaction. The launch of HTS's external portal aligned with the Korean government's announcement of 11 top priority e-government projects in 2001, and the HTS organization benefited from this initiative. At first, only a limited number of taxpayers were enrolled, but NTS devoted itself to public relations, holding meetings with tax agents, partner associations, and others. During tax return season, tax offices nationwide held classes on e-filing, and NTS prepared and distributed a textbook, *The Easy-to-Use HTS*, to educate corporations and individual businesses. In 2004, tax credits for e-filing was legislated. As a result of these and other efforts by tax authorities, more than 90 percent of Korean taxpayers today file and report their taxes on the Internet.

Another key element of Korean e-tax administration is the mandatory Electronic Tax Invoice (ETI) system for claiming VAT input tax credits, initiated in 2011. Korea first introduced ETI in 1997 as an alternative to paper-based tax invoices that recognized electronic filing or electronic data storage as legally effective instruments. Its use was not compulsory, however, and not many taxpayers used it. The Korean government first set up the legal and regulatory framework granting electronic documents the same legal effects as those given to paper documents. The next step was ensuring the compatibility of electronic documents and digital signature formats. In June 2005, the Korea Institute for Electronic Commerce began to certify ETI issuers and service providers that passed the criteria for the standard ETI. In November 2009, the NTS launched a dedicated website, e-Invoice Issuance System (e-sero), through which taxpayers unable to issue ETIs on their own could log into the system and obtain one for free. Following passage of a series of legislation, corporate businesses were required to issue ETIs starting in 2011; a year later, individual businesses with annual sales exceeding KRW 1 billion (approximately US\$910,000) also had to issue ETIs. From July 1, 2014, individual businesses with annual sales exceeding KRW 300 million (approximately US\$270,000) were required to issue ETIs. In January 2012, NTS launched an ETI early-warning system (EWS) to combat VAT fraud and identify input tax credit fraud. EWS profiles suspicious transactions using information from ETIs, corporate income tax filings, tax delinquency records, and other sources; tax examiners evaluate it and decide on further actions. EWS not only issues early warning of tax frauds, it also conducts risk assessment and verifies VAT refund claims.

While the tax authority could trace business-to-business (B2B) transactions through VAT invoice audit trails, business-to-customer (B2C) transactions, especially cash sales, could not be traced. Unlike businesses, which needed to claim input VAT credit against their output VAT, end-consumers did not have any incentives to obtain receipts or report purchases to tax authorities. To address this, tax incentives for electronically traceable payments (TIETP) were introduced in 1999. TIETP promotes credit/debit card use by allowing wage income earners a deduction from the income tax base if their spending with credit/debit cards exceeds a certain threshold. Wage earners eligible for tax deductions for credit/debit card payments may submit, via their employers, ETP tax deduction application forms and credit/debit card transaction reports issued by their credit card companies/banks. These materials must accompany the wage earners' labor income tax settlements filed at the end of the tax year. Furthermore, according to relevant tax law, credit card companies/banks must periodically submit member stores' credit/debit card transaction data electronically to NTS. Later in 2005, electronically traceable payments were expanded to include electronically traceable cash receipts (ETCR). ETCR makes even cash payments electronically traceable by NTS. People who prefer to pay in cash rather than using a credit/debit card can ask retailers for ETCRs, which are also eligible for tax deduction. The retailer issues the ETCR through its credit card payment terminal, and the data are automatically transferred to NTS. Through TIETP, electronically traceable payments (ETPs) sharply increased. Today, the majority of private consumption in Korea is paid for through ETPs, bringing the country close to a cashless society.

In 2015, NTS launched the Next-Generation Tax Integration System (NTIS). NTIS has no independent, stand-alone service portals; rather, it has an integrated taxpayer service portal for external users and an NTS single-window portal for internal users. By integrating portals and systems, NTIS provides taxpayers with access to a range of tax services through a one-stop external portal, and the tax authority gains the ability to analyze integrated big tax data.

The journey to fully implementing and harvesting the benefits of an e-tax administration, as seen in the Korea case study, is neither short nor simple. The challenges and success factors outlined in Table 2 highlight lessons learned from the execution and outcomes of ITMS implementation and e-tax enabling projects in Korea and similar experiences in several developing countries. The chart highlights key challenges in adaptation, institutional capacity and capability, and large ICT project management. Recognizing the scale of these challenges early in the modernization process and developing strategies and plans to address them greatly improves the probability of success.

TABLE 2 | Challenges and Success Factors for Instituting E-Tax Administration

| Challenge | |
|---|--|
| Adaptive challenges | <ol style="list-style-type: none"> 1. Maturing business community capacity and culture to maintain proper tax accounting books and records 2. Raising computer literacy and the utilization of tax accounting software and e-filing in the business community 3. Creating incentives to use electronic rather than cash payments 4. Obtaining and sustaining parliamentary and ministry engagement and sponsorship for e-governance and e-tax administration |
| Institutional capacity and capability challenges | <ol style="list-style-type: none"> 1. Lack of business analysts to support preparation of ITMS requirements or business process reengineering 2. Poor or little understanding of the role of the tax administration business owners in ICT development 3. Lack of capacity to lead a large and complex ITMS procurement effort 4. Unable to attract and retain ICT analyst and programmer staff 5. Unable to harvest the value of the data resources put in place through ITMS implementation and other e-tax initiatives in the form of improved revenues from enforcement and compliance risk profiling tools |
| Large ICT project management challenges | <ol style="list-style-type: none"> 1. Long lead time to ITMS implementation (three to five years) elevates project risk factors 2. Scope creep 3. Navigating between adopting tax administration good practices that come with a commercial off-the-shelf (COTS) ITMS solution and doing extensive BPR on key business processes 4. Management of change issues that lead to resistance or rejection of the new ITMS 5. Long-term sustainability of the ITMS solution once the implementation contract is concluded, with capacity in several ICT service management disciplines to manage the ITMS investment |



Introduction: Key Drivers for e-Tax Administration

Voluntary compliance is the foundation of modern tax administrations' ability to generate revenue. A culture of compliance is developed and sustained through taxpayer education, supportive and encouraging taxpayer service levels, and responsible enforcement and compliance programs. E-tax administrations can leverage the capabilities of modern Integrated ICT tax management solutions (ITMS) to obtain the data necessary to support these efforts.

For tax administrations in developing countries, ITMS can help significantly by (i) identifying and reducing the shadow economy, (ii) enabling and optimizing tax compliance programs, and (iii) promoting voluntary compliance through improved taxpayer service, self-service options, and simplified filing and reporting processes. Significant improvements can be made by extending the benefits and opportunities of e-tax connection to the wider taxpayer community (for example, through e-pay, e-invoice, and e-file). Other opportunities include aggregating tax data with other sources for compliance-risk profiling using “big data” analytical and data mining tools.

The roadmap to using modernization to achieve and sustain compliance is not limited to ICT capacity and solutions; a mature tax compliance culture and institutional capacity in tax administration are equally or more important for implementation and sustainability. A tax administration modernization roadmap for developing countries requires frank assessment of the capability and maturity of the current tax administration and of the degree of tax compliance. (See “Capability and Maturity Model Supporting e-Tax Administration” below for additional details.)

The last chapter, “Key Challenges and Success Factors for Enabling e-Tax Administration in Developing Economies,” emphasizes three basic issues:

1. Adaptive challenges (perceptions, culture, political and historical influences, and attitudes toward tax compliance)
2. Institutional capacity and capability challenges
3. Challenges inherent in managing large ICT projects



The Challenge of Tax Administration in Developing Countries: How an Integrated ICT Tax Management Solution Can Help

Tax administrations face intensifying pressure to increase revenue collections with the least compliance burden on taxpayers and to do so at a reasonable cost to both the taxpayers and the tax administration. In the wake of the financial crisis of 2008–09, which saw serious declines in tax revenues across the world, even in developed countries, the realization has been growing that developing countries must step up mobilization of their domestic revenues and become less reliant on external aid. While some tax revenue increases must come from changes in tax policy, sharp improvements in tax administration must be responsible for a large portion. This is mainly because any tax-generating changes in tax policy will necessarily have unwanted side effects on economic decision making and may impact investment and economic growth. In addition, changing tax policy is typically far more politically difficult to effect.

In this context, developing countries' tax administrations seek to become sharper, more efficient, more effective, and less burdensome for taxpayers. These complex, even apparently contradictory, objectives can only be achieved through information technology. ICT enables tax administrations to sharpen enforcement capabilities by gathering and analyzing data on taxpayers' business transactions more efficiently and, at the same time, it provides an accessible, convenient, low- or no-cost platform for cooperative engagement with taxpayers.

Tax administrations, essentially, are organizations that process data and generate information. The ability to gather, use, and analyze data effectively is at the heart of the benefits ICT provides—tax processing and compliance become more efficient. Given the challenges of the current business environment, in which financial transactions become ever more complex and huge amounts of data are generated, IT systems provide the only means for sifting through the vast quantities of data and processing it into *information* that is useful for tax administration and enforcement. In addition, it can aid developing countries in dealing with the large shadow economies that hide business and financial transactions.

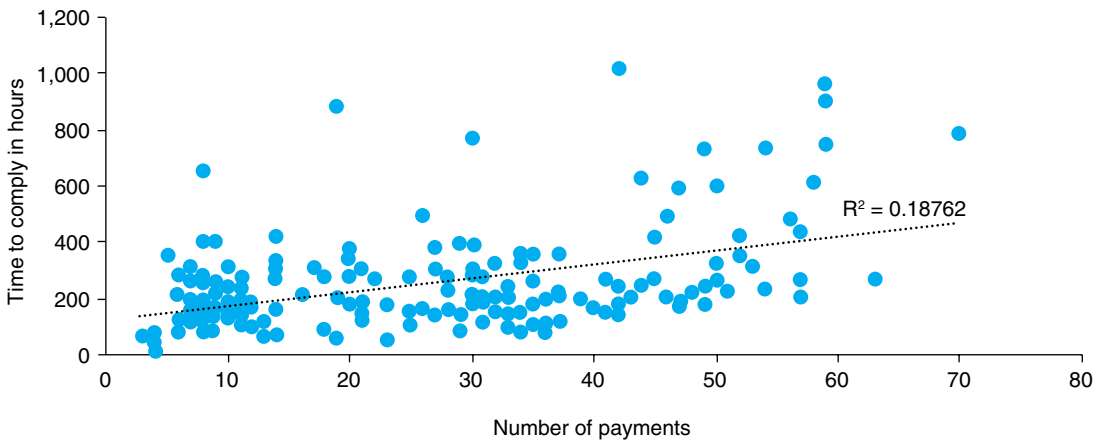
Taxpayer Services through ICT and Lower Compliance Burdens

The other task of tax administrations—improving taxpayer services—is also best achieved through the use of ICT technologies. ICT has advanced rapidly in the last two decades, and the technology has become far more available and less costly. Computer and Internet-based interfaces have also become far more user friendly, so taxpayers with no more than a basic familiarity with computers can use the

systems successfully. This has meant that business, private individuals, and government agencies now routinely use ICT solutions, and the technology has become pervasive. Even tax officials with no training in using ICT applications can easily use ICT solutions and applications to administer the tax system.

ICT has made compliance with the tax system much easier for taxpayers. It is possible to file tax declarations and make tax payments from anywhere at any given time. This has provided taxpayers with tremendous convenience by eliminating the need to queue up at tax offices to comply with basic requirements. An analysis of the Doing Business Paying Taxes¹ data reveals that countries that have implemented electronic tax filing also reduce the number of hours taxpayers spend on compliance. The methodology of Doing Business posits that when a country has successfully implemented e-filing for a majority of taxpayers, the number of payments is taken as one, making Number of Payments a good proxy for use of e-filing. The Time to Comply indicator is a good measure of the compliance burden on taxpayers; lower numbers of hours spent preparing and filing tax declarations indicate lower costs of compliance. A positive relationship between the Number of Payments subindicator and the Time to Comply subindicator in the Doing Business Paying Taxes report means a lower Number of Payments (indicating use of e-filing) and lower Time to Comply: that is, lower compliance burdens on taxpayers (see Figure 1).

FIGURE 1 | Time to Comply (hours) and Number of Payments



Source: *Doing Business 2016*, The World Bank Group, and authors' calculations.

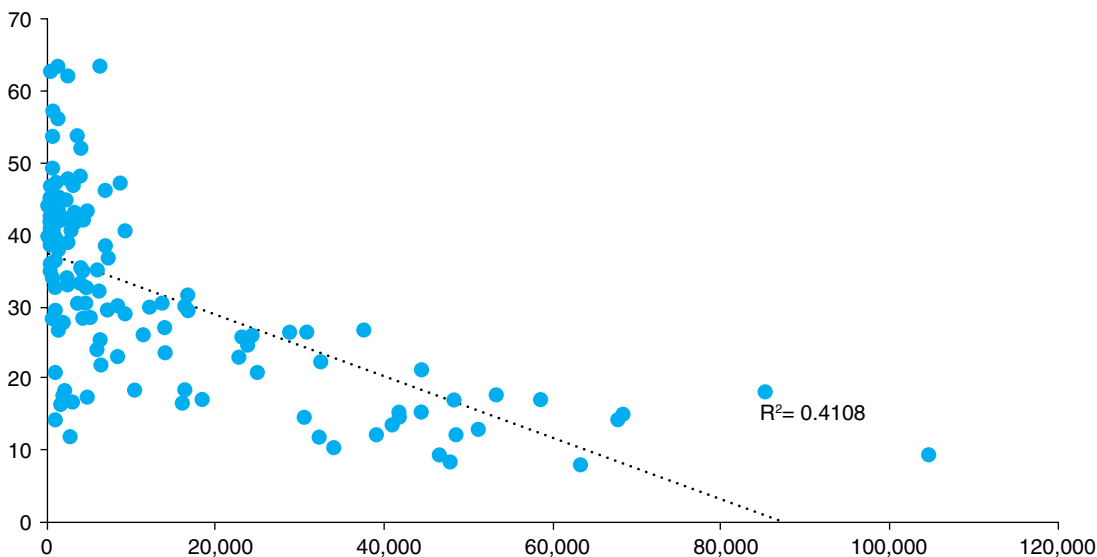
Developing Countries and the Shadow Economy

The presence of large shadow economies hinders tax regulation and enforcement in developing countries. Schneider, Buehn, and Montenegro (2010) provide a useful definition: “[T]he shadow economy includes all market-based legal production of goods and services that are deliberately concealed from public authorities to avoid payment of income, value added or other taxes; to avoid payment of social security contributions; having to meet certain legal labor market standards, such as minimum wages, maximum working hours, safety standards, etc.; and complying with certain administrative procedures,

1. *Doing Business 2016*, The World Bank Group.

such as completing statistical questionnaires or administrative forms.”² As this definition makes clear, the shadow economy easily provides “hiding places” for business transactions, allowing them to go entirely unreported or underreported to tax authorities. Shadow economies are typically much larger in developing economies than elsewhere (see Figure 2); hence, the challenge to tax administrations becomes much larger in countries with developing economies.

FIGURE 2 | Shadow Economy as a Percentage of GDP and per Capita GDP, 2007



Source: Schneider, Buehn, and Montenegro (2010); World Bank Data; authors' calculations.

The shadow economy and tax collections. Tax administrations struggle to maximize potential tax collections, and as expected, a negative correlation exists between the size of the shadow economy and the amount of taxes collected, as a percent of GDP (see Figure 3). Some theories suggest that a reverse relationship also exists, that is, low tax collection creates a weaker fiscal contract between citizens and the state, engendering a larger shadow economy. These theories point to prevailing low tax morale that demotivates citizens to “move out of the shadows” and pay their fair share of taxes.

We also examined the relation between tax-GDP and shadow-GDP, *controlling for per capita GDP*. We find that the negative relation between the two key ratios is sustained and significant at the 5 percent level. We get a coefficient of -0.125 , which indicates that a 1 percent reduction in the shadow economy ratio correlates with an estimated 0.125 percent *increase* in the tax ratio's numerical value.³

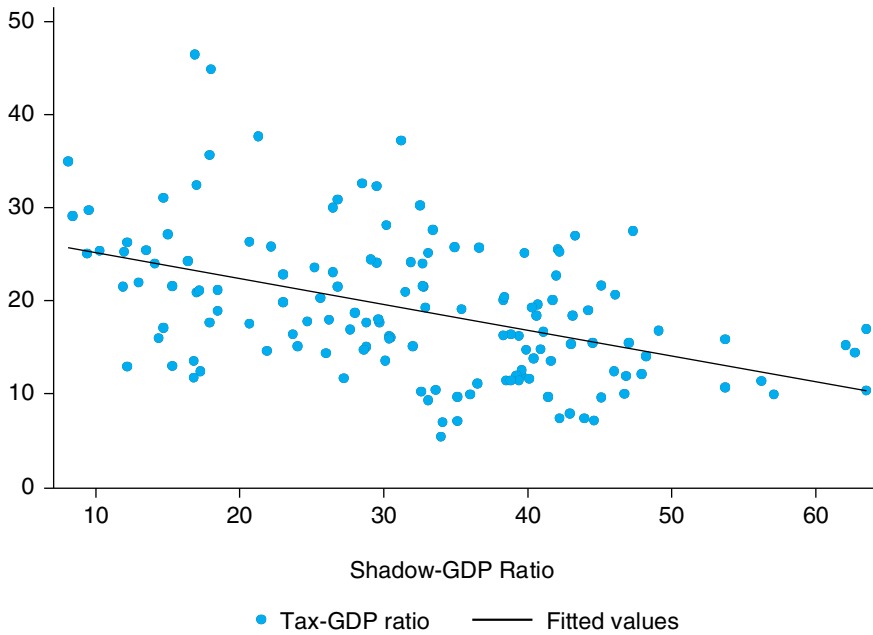
2. Schneider, Buehn, and Montenegro 2010.

3. `. reg taxgdpratio shadowgdpratio gdppecapita`

| Source | SS | df | MS | Number of obs | = | 143 |
|----------|------------|-----|------------|---------------|---|--------|
| Model | 2649.90281 | 2 | 1324.9514 | F(2, 140) | = | 32.33 |
| Residual | 5736.65811 | 140 | 40.9761293 | Prob > F | = | 0.0000 |
| Total | 8386.56091 | 142 | 59.0602881 | R-squared | = | 0.3160 |
| | | | | Adj R-squared | = | 0.3062 |
| | | | | Root MSE | = | 6.4013 |

| taxgdpratio | Coef. | Std. Err. | t | P> t | [95% Conf. Interval] |
|----------------|-----------|-----------|-------|-------|----------------------|
| shadowgdpratio | -.1256445 | .0534684 | -2.35 | 0.020 | -.2313543 -.0199347 |
| gdppecapita | .0001459 | .0000353 | 4.70 | 0.000 | .0000962 .0002356 |
| _cons | 21.02262 | 2.078612 | 10.11 | 0.000 | 16.9131 25.13215 |

FIGURE 3 | Shadow Economy as a Percentage of GDP and Tax-GDP Ratio, 2007



Source: Schneider, Buehn, and Montenegro (2010); IMF Data; World Bank Data; authors' calculations.

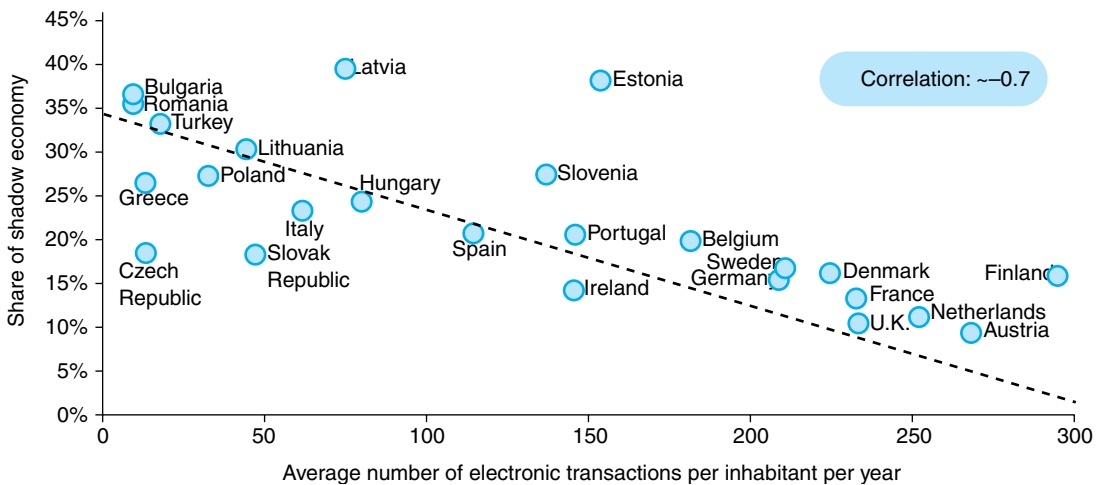
Shadow economy facilitates unreported transactions. The presence of the shadow economy provides opportunities for underreporting or nonreporting of income and sales. Consider this example: A business purchases raw materials in cash, uses these raw materials to produce its goods, pays for inputs (such as labor) in cash, and then sells its goods for cash (or deposits sales proceeds in unreported bank accounts). This entire production and sales cycle remains unreported—part of the shadow economy—never once coming to the attention of tax authorities. This becomes possible because at every stage counterparties are ready and willing to accept and make unreported cash payments. The raw materials seller willingly sells for cash and does not report the proceeds; the factory worker willingly accepts cash and does not report the income; the final product purchaser willingly buys in cash and saves on the taxes that should have been collected. The raw materials seller accepts cash because it can be used for other purchases and expenses without being brought into a declared bank account. Similarly, the worker uses cash to purchase goods and services to meet his or her needs. Finally, the goods purchaser can pay cash for them because he or she received cash for sales made to another purchaser. The cycle goes on.

It is extremely difficult to break the cycle of noncompliance because each party involved has strong incentives to perpetuate the cycle to avoid paying taxes on sales and income. Given such patterns of collusive shadow economy participation, the policy environment and administrative measures must counter with incentives and disincentives to break or discourage them. Once economic actors can be guided out of the shadows, ICT use can help break the vicious cycle of cash transactions.

In this context, ICT becomes critically useful. It is only through IT that tax administrations can regularly collect systematic data on financial transactions, analyze the data to discover taxpayers or potential taxpayers who should be scrutinized or audited, use the data to cross-check information in taxpayers' account books for irregularities, make accurate assessments of taxes owed, and finally, require taxpayers to comply and pay the fair taxes due.

Modern or e-payment systems and the shadow economy. One inference from the above is that where cash payment systems are replaced by modern payment systems, financial transactions find fewer hiding places. Once that happens, we would expect the shadow economy to shrink, and a study by Kearney and Schneider (2009) for the European economy confirms this hypothesis. Tax measures—policy and administrative—can help incentivize formal payments for business transactions through banking channels, including electronic payments and use of “plastic money.”

FIGURE 4 | Shadow Economy as a Percentage of GDP and Number of Electronic Transactions (per habitant/year)



Note: EU-27 (no data available for Cyprus, Luxembourg, Malta) plus Turkey

Source: Dr. Friedrich Schneider, Johannes Kepler University of Linz, Austria; A. T. Kearney analysis

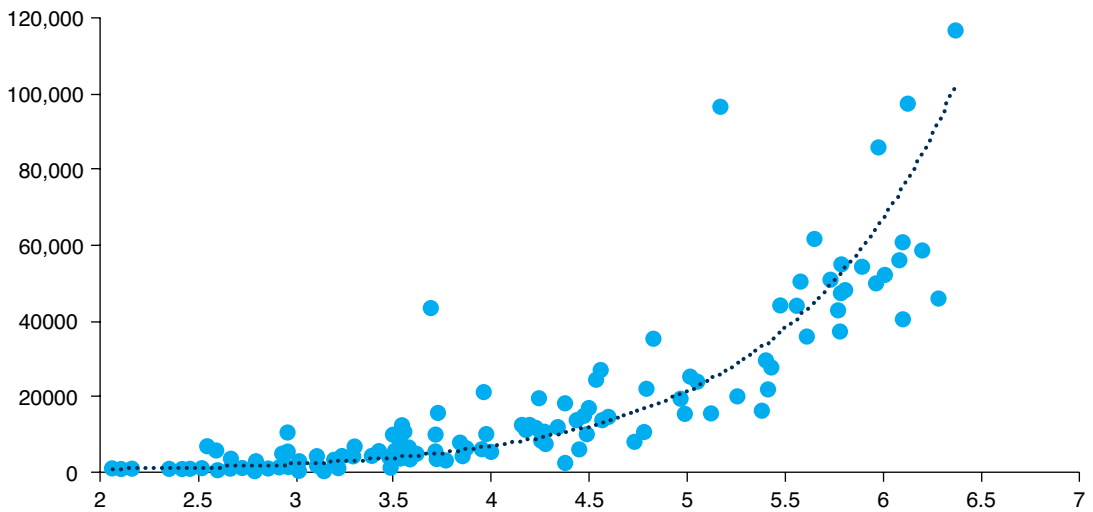
As noted, tax administrations can adopt specific strategies to improve tax enforcement against shadow economy transactions, particularly underreporting or nonreporting of sales. ICT-based technological platforms that facilitate formal payments are critical in achieving this objective.

Technological Readiness

While ICT systems are now accepted as the backbone of any modern tax administration, many developing countries are not ready to adopt them. The World Economic Forum's Competitiveness Report

defines technological readiness—the ability to adopt modern ICT technology—as follows: “The technological readiness pillar measures the agility with which an economy adopts existing technologies to enhance the productivity of its industries, with specific emphasis on its capacity to fully leverage information and communication technologies (ICTs) in daily activities and production processes for increased efficiency and enabling innovation for competitiveness. Whether the technology used has or has not been developed within national borders is irrelevant for its ability to enhance productivity. The central point is that the firms operating in the country need to have access to advanced products and blueprints and the ability to absorb and use them.”⁴ Comparing this indicator to per capita GDP, we find, as expected, that Technological Readiness is lower in developing than in developed countries. Interestingly, higher levels of Technological Readiness are associated with exponentially high levels of per capita GDP (Figure 5). As discussed, in the modern, digital world, tax administrations must increasingly run on ICT platforms and use technology to enforce tax compliance and improve taxpayer service. Modern ICT systems allow tax administrations to access data on taxpayers’ financial transactions from banks and other institutions on a regular and automatic basis. This data can be automatically analyzed by ICT systems to generate taxpayer risk profiles and aid in risk management. Tax administrations also use other technological means, such as electronic invoicing systems, to ensure that sales and profits do not go unreported or underreported.

FIGURE 5 | Technological Readiness and per Capita GDP, 2014



Source: World Economic Forum, Global Competitiveness Index; World Bank Data; authors’ calculations.

4. World Economic Forum, Global Competitiveness Report, <http://reports.weforum.org/global-competitiveness-report-2015-2016/appendix-methodology-and-computation-of-the-global-competitiveness-index-2015-2016/>

The main inferences for developing countries. The following inferences can be drawn:

- Shadow economies are large in developing countries, and ICT system use becomes urgent where large shadow economies exist.
- ICT systems help sharpen tax administrators' enforcement capabilities and reduce compliance burdens on taxpayers.
- Technological readiness will likely be low in developing countries; this presents a challenge, since technology use has a strong positive impact on reducing the shadow-GDP ratio and improving the tax-GDP ratio.

The Korean case study in the following sections demonstrates that ICT solutions can tackle the persistent challenge of the shadow economy. Given that Korea's level of development and tax administration maturity in the 1990s when these reforms were inaugurated resembled those of most developing countries today, the Korean experience can provide valuable lessons.



Capability and Maturity Model Supporting e-Tax Administration

Table 3 provides a guide to assessing tax modernization capability and maturity and can aid in strategic and implementation planning across the spectrum of challenges facing tax administration modernization and e-tax initiatives. The level of precision and detail is intended to identify areas in need of attention, not to serve as a report card for the tax administration itself, as many factors within the capability and maturity model are beyond the control of tax administrations. All domains require reasonable levels of capability and maturity, however, if e-tax administration objectives are to be attained.

TABLE 3 | Capability and Maturity Model

| | Stage 1 | Stage 2 | Stage 3 |
|---|---|---|---|
| Maturity of taxpayer compliance culture | <ul style="list-style-type: none"> Accounting practices are weak, proper books and records are not kept. Noncompliance is the predominant tax behavior. Tax evasion is viewed as socially acceptable. | <ul style="list-style-type: none"> Books and records are generally available but underreporting of cash sales is common (second set of books). Voluntary compliance obligations are broadly understood but not fully practiced by the majority of taxpayers. Tax evasion is generally viewed as socially unacceptable. | <ul style="list-style-type: none"> Books and records are available, most often in electronic form, and minimal cash underreporting occurs. Voluntary compliance obligations are understood and met by the majority of taxpayers. Tax evasion is viewed as parasitic behavior. |
| Taxpayer e-service literacy and capability | <ul style="list-style-type: none"> Low computer literacy prevails among business owners. Little or no electronic record keeping occurs. The economy is largely cash based, with low or no penetration of electronic payment methods. | <ul style="list-style-type: none"> The majority of businesses use computers and the Internet to support their businesses. The majority of businesses use accounting, cash registers, and payroll software or services. Credit and debit card payments are in common use. | <ul style="list-style-type: none"> Businesses have fully adapted to electronic means for B2B, B2C, and data sharing with authorities. Businesses' preferred method of filing returns and other tax records is electronic. Electronic payment is the predominant method of completing sales and may include e-Receipt for cash sales. |

(continued)

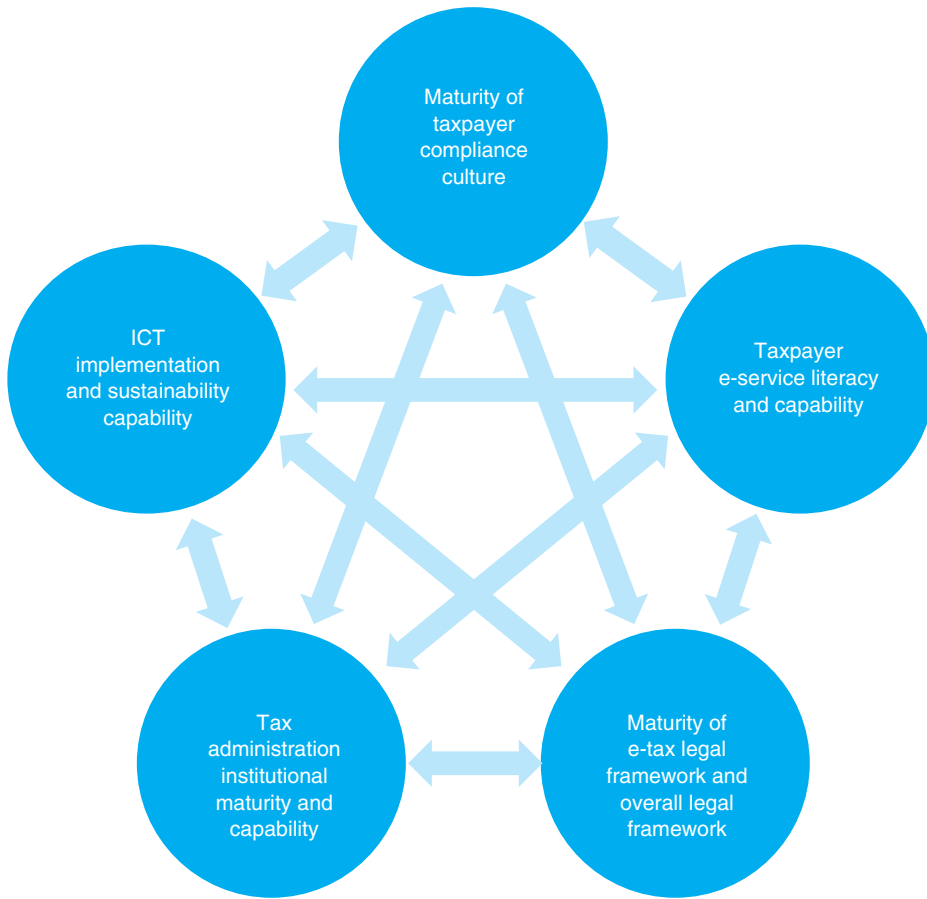
TABLE 3 | Continued

| | Stage 1 | Stage 2 | Stage 3 |
|--|---|--|--|
| Maturity of e-tax legal framework and overall legal framework | <ul style="list-style-type: none"> • No legislation supports e-transactions or electronic signatures. • No e-filing services are in place. • The tax code has not been modernized. | <ul style="list-style-type: none"> • Case law supports the authenticity needs of e-transactions for tax filing, payments, and so on. • E-filing is mandatory for some taxes (i.e., VAT) or tax thresholds and voluntary for others. • The tax code has been modernized somewhat to improve clarity and simplify administration. | <ul style="list-style-type: none"> • Legislation is in place to support electronic signatures and other authentication needs for government services. • E-filing is mandatory for business taxes and has broad acceptance (70%) for personal income taxes (PIT). • The tax code has been modernized and simplified. |
| Tax administration institutional maturity and capability | <ul style="list-style-type: none"> • Tax administration is split across more than one department and/or is organized by tax. • Taxpayer service is very limited and the concept of the need for excellence in service is not part of the tax administration culture. • No ICT support is available beyond LAN and desktop services. • Tax systems, if any, have duplicate, incomplete, and/or inaccurate taxpayer information and do not have any process or method in place to cure these data deficiencies. • No trained business analyst resources or capabilities exist for development projects. All staff focuses on operations. • The tax administration has no experience managing large modernization initiatives with or without a major ICT component. | <ul style="list-style-type: none"> • Tax administration is organized by function and has partially harmonized operations. • Taxpayer service exists as a function and is broadly supported in the form of educational pamphlets, a website for self-service, and a single inquiry phone number. • Some ICT support is available through ad hoc service—outsourcing arrangements. • Limited business analyst resources are available for development project activities, but the priority remains operations. • The tax administration has some experience managing large modernization initiatives and good practices in place for change management. | <ul style="list-style-type: none"> • A fully functional model is in place, and audit and collection activities consider all tax types in case selection. • Taxpayer service functionality is robust across all channels, call center technology is in use, all forms and publications are available online, and tools are in use to monitor and improve the customer website experience. • Taxpayer service standards, including e-services, are published and performance measures are in place. • Full ICT services are available, either through in-house staff or through long-term outsource arrangements. • Sufficient business analysts are available to support major development activity and ongoing operations. • The tax administration is very experienced at managing large modernization initiatives and has best practices in place for change management. |

| | Stage 1 | Stage 2 | Stage 3 |
|---|---|--|--|
| ICT implementation and sustainability capability | <ul style="list-style-type: none"> • High-speed Internet in towns and cities is not sufficiently reliable to support e-services. Little or no e-services are offered in the country. • Tax administration has no experience implementing major multiyear ICT projects and has no project management capacity. • The tax administration and its ICT service support have little experience with ICT change, problem, release, and vendor management. • The tax administration has no experience developing and executing major ICT procurements. • The tax administration has few data resources with sufficient integrity to support data analytics and mining for risk profiling. | <ul style="list-style-type: none"> • High-speed Internet has reached sufficient penetration in urban areas to include the majority of businesses, and some e-services are already in place in public or private sectors. • The tax administration has successfully implemented at least one major ICT project and has some project management capacity. • The tax administration and its ICT service provider follow good practices in change, problem, release, and vendor management. • The tax administration has some experience with major ICT procurement or can get expertise from elsewhere in the government. • The tax administration has operational data stores and third-party structured data available for data analytics, but it lacks knowledge workers with the skills necessary to use data mining and analytic tools and unstructured data. | <ul style="list-style-type: none"> • High-speed Internet is broadly available in all but the most remote areas. E-services are common. • Smart phones are in use for payments and e-filing simple, pre-filled PIT, and nil VAT returns. • The tax administration is always investing in additional ICT functionality and is familiar with managing complex ICT projects. • The tax administration and its ICT service provider follow best practices in change, problem, release, and vendor management. • The tax administration has the necessary expertise and experience to manage large and complex ICT procurements. • The tax administration is rich in data resources (structured and unstructured) for risk profiling and can attract and retain the knowledge workers (statisticians, actuaries, mathematicians) needed to conduct data mining and analytics. • The tax administration has extensive integration with other government agencies and third-party data. |

Interdependency is an important characteristic of the core elements of e-tax administration development. Maturity of taxpayer compliance culture, for example, which is closely related to taxpayer e-tax literacy and capability, does not evolve on its own. Its cultivation depends on the design, practice, and efficacy of taxpayer service and enforcement that results from tax administration institutional maturity and capacity as well as ICT implementation and sustainability capability. These in turn are severely affected by (or sometimes affect) maturity of the overall legal framework, including e-tax legal

FIGURE 6 | Interdependency of the Core Elements of the Capability and Maturity Model

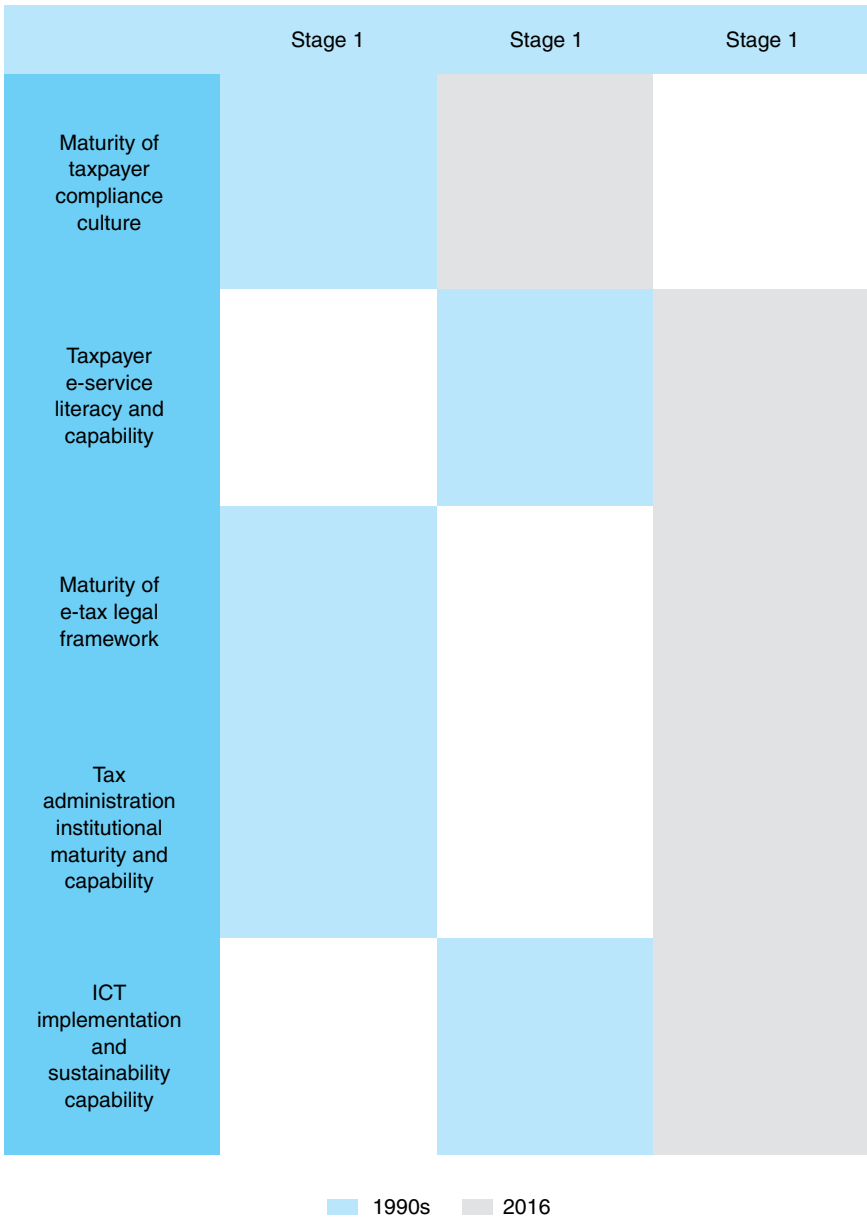


framework. These interdependencies, illustrated in Figure 6, highlight the need to use a comprehensive approach when designing a country’s tax reforms for electronic tax administration.

The outcome of a maturity self-assessment (with or without technical support) should be used to inform stakeholders regarding the development and execution of the tax administration’s changing management agenda and to enlist support from stakeholders outside the tax administration who have key roles to play in a successful tax modernization strategy.

In Figure 7, the authors illustrate Korea’s journey, explained in detail in the case study. The format provides an example of the value of plotting a tax environment and tax agency maturity and capability self-assessment before developing roadmaps for the desired future modernization end state.

FIGURE 7 | The Maturation Experience: Placing the Republic of Korea on the Maturity Grid





The Korean e-Tax Administration Experience: A Case Study

Introduction and Republic of Korea Country Context

The Republic of Korea has come a long way in five short decades—from a country whose gross domestic product (GDP) per capita was just US\$120 in 1962 (World Bank Data), comparable with levels in the poorer countries of Africa and Asia, to a trillion dollar economy by the mid-2000s. Korea today is a high-tech industrialized economy.

Korea followed a model of industrialization focused on growing exports and substituting domestic production for imports. A system of close government and business ties made this success possible. The government promoted the import of raw materials and technology, and encouraged savings and investment over consumption.

Even in 1980, when the government began investing heavily in information technology, Korea's per capita GDP was about US\$1,700. The strong emphasis on technology development paved the way for widespread use of information technology. This in turn facilitated various public sector reforms, including in tax administration. In the past two decades, Korea emerged from a low technology base to a leading country in information technology (IT) manufacturing and adoption (Lee and Joshi 2015). In a 2013 report, the International Telecommunications Union ranked Korea number one in the world on its IT Development Index, even higher than the Nordic countries, which were close behind. Korea has one of the world's highest average Internet broadband speeds at 28.6 Mbps.⁵ The main driver of Korea's IT revolution has been leading investments by government and industry conglomerates.

The study below follows the long, interesting journey of Korea and its National Tax Service (NTS) from initial adoption of ICT as the foundation and enabler of tax administration and compliance to the country's first integrated tax management solution (TIS, tax integrated system), which, supported by the necessary legal and institutional frameworks, in turn permitted early entry into electronic self-service through the tax administration's HomeTax external portal solution. The more recently developed technology and application service platform, the Next-Generation Tax Integrated System (NTIS), offers homogenous external and internal portal online services on a sustainable ICT platform.

Simultaneously with modernization, Korea launched early and ambitious initiatives to address refund fraud and evasion issues by migrating to a mandatory electronic invoicing regime for VAT transactions.

5. <https://www.akamai.com/es/es/about/our-thinking/state-of-the-internet-report/state-of-the-internet-connectivity-visualization.jsp>.

Through a series of ICT initiatives and tax incentives, it has achieved record levels of electronic payment data from citizens and businesses, significantly affecting the underground economy. The timeline of these journeys is significant, as each stage had to be managed within the legal framework and prevailing maturity levels of the taxpayer compliance culture, institutional capacity, ICT maturity and capability, taxpayer ICT readiness, and ICT literacy.

The “X-factor” behind Korea’s successful e-tax development experience has been its strong cadre of high-capacity human resources, both within the tax administration and in government more broadly, and a highly proficient degree of ICT development and operations. Even so, many of the policies Korea adopted and the strategies it designed can be usefully deployed in other contexts, given today’s possibilities for outsourcing ICT skills and technologies.

Korea: An Early and Extensive Adopter of ICT in Tax Administration

National Tax Service Early Automation of Tax Processing

Early Beginnings

The development history of electronic tax administration (e-tax) in Korea represents two decades of effort, enthusiasm, and cooperation among government, private sectors, and Korea’s citizens. In 1967, a year after founding the Korea NTS, the Korean government began introducing computer systems to automate tax administration work processes. Korea’s e-tax administration with ICT had five stages: preparation (1966 to 1970), process-oriented computation (1971 to 1982), expansion of distributed processing (1983 to 1993), administration automation (1994 to 1997), and e-tax administration with tax integrated system (1997 to 2000).⁶

In the early stages, information technology had been applied traditionally to automate tax officers’ routine workflow processes by using OCR to input tax assessing, payments, accounting data, and issuance of tax notices. Full-fledged e-tax administration began in 1997, when the new TIS provided integrated information services across the NTS (Choi and Han 2006; Hwang 2002; Hyun and Jeong 2001).⁷

Tax Integrated System Launch in 1997

TIS began with the NTS tax administration ICT modernization initiative in the mid-1990s with the goal of supporting two important tax policies—“prohibition of pseudo names and mandatory use of real names for bank accounts” and “global income taxation on aggregate financial incomes”—adopted

6. See Appendix 1, “History of Korea’s e-Tax Administration.”

7. The development stages of the early years can be categorized by an “introduction of computation in tax administration (1967 to 1996)” and “initiation of e-tax administration (1997 to 2002, until HomeTax service opens).”

in 1993 and 1996, respectively. NTS had to collect and analyze massive financial income data for each taxpayer to support global income taxation on financial incomes (Choi and Han 2006).⁸

Between 1994 and 1996, when NTS conducted a feasibility study on TIS and built its implementation plan, its objective was to increase efficiency in everyday tax administration work processes through computerization and, further, to strengthen NTS capabilities to enforce tax compliance in line with changing tax policy. The government of Korea had enacted the Framework Act on Informatization Promotion in 1995 and announced the national ICT strategy, “National Informatization Promotion Plan: Small but Efficient Government,” in 1996. NTS therefore benefited from ICT infrastructure constructed under the national ICT projects and guided by ICT promotion acts and national strategic ICT plans.

HomeTax External User Portal Launch 2002

HomeTax Service (HTS),⁹ initiated in April 2002, allowed taxpayers to file, report, and pay various taxes, including VAT and personal and corporate income taxes, from home or work using the Internet. The TIS and taxpayers were networked through the HTS, making tax services more easily available and convenient. Better service quality reduced the costs of tax compliance and improved taxpayer satisfaction. Taxpayers could directly upload various tax data, improving data integrity and the promptness and efficiency of the NTS, thus saving administrative costs by reducing personnel required to input data for tax filing and payment.

The HomeTax external portal launch aligned with the Korean government’s announcement in 2011 of 11 top-priority e-government projects.¹⁰ The focus of the tax administration had moved on from efficiency and strengthened compliance to improved services for citizens and businesses. Other enhancements were subsequently made to the TIS and HomeTax legacy systems until NTIS was implemented in 2015. As of 2015, more than 90 percent of Korean taxpayers file and report their taxes on the Internet.¹¹

Development of Legal and Institutional Framework Enabling ICT Tax Administration

Technologically, the successful deployment of ICT infrastructures was a cornerstone for developing and implementing e-governance services, such as the government administrative network and nationwide broadband network in 1990s. The strong leadership of government, however, fostered e-governance and put online public services in the hands of citizens and businesses by initiating a national ICT strategy and policy, followed by passage of the relevant law (Kim 2012).

8. Integrated taxation on financial incomes needs collection of financial sources and transaction histories of each entity (individual and business, etc.) and integrated data management and interoperability of information with other governmental agencies and financial organizations.

9. A detailed discussion of the HomeTax Service appears in Table 4.

10. NTS prepared HomeTax implementation based on its own demand and needs for enhanced e-tax service delivery, even before the Korean government began prioritizing e-Government projects (personal interview with the NTS IT officials, October 2016).

11. 2015 *Statistical Yearbook of National Tax*, Korea, National Tax Service, 2015.

A brief history of Korea’s national ICT and e-government strategies and the law relevant to tax administration modernization and HomeTax deployment appears in Table 4.

In addition to the national e-government agenda, a key driver of TIS implementation was the need for a system responsive to the changing business environment and national finance policies, such as the

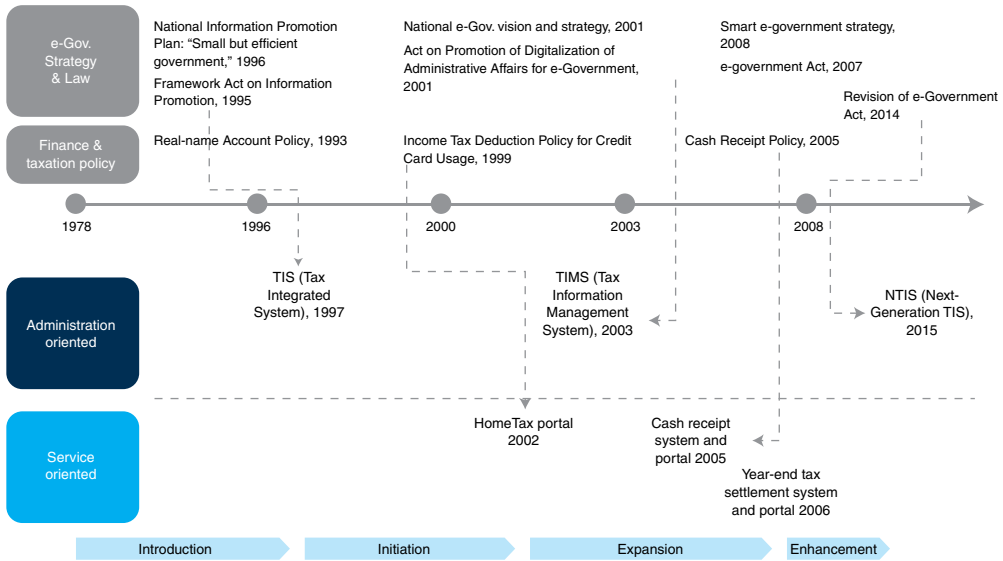
TABLE 4 | Development History of e-Governance in Korea

| Stage | Year | Description | Relevant strategy and law | Relevant changes in tax administration |
|------------|-----------------|---|---|--|
| Inception | 1978 to 1996 | <ul style="list-style-type: none"> • Implementing administrative computerization (1978–1987) • Building administrative networks (1987–1996) | <ul style="list-style-type: none"> • Framework Act on Informatization promotion, 1995 | <ul style="list-style-type: none"> • Introduction of computerization, ~1994 • Planning for TIS implementation, 1995–1996 |
| Foundation | 1996 to 2000 | <ul style="list-style-type: none"> • Building nationwide broadband networks • Modernization for administration efficiency with ICT | <ul style="list-style-type: none"> • National informatization promotion plan: “Small but efficient government,” 1996 | <ul style="list-style-type: none"> • Launch TIS, 1997 |
| Launch | 2001 to 2002 | <ul style="list-style-type: none"> • 11 major tasks; HomeTax, Government-for-Citizens (G4C) Portal,* patent, e-procurement, national finance information, etc. • Government-wide informatization of core infrastructure | <ul style="list-style-type: none"> • National e-Government vision and strategy, 2001 • Act on Narrowing Digital divide, 2001 • Act on Promotion of Information and Communication Network Utilization and Information Protection, 2001 • Act on Promotion of Digitalization of Administrative Affairs for e-Government, 2001 | <ul style="list-style-type: none"> • Launch HomeTax Service Portal, 2002 |
| Diffusion | 2003 to 2007 | <ul style="list-style-type: none"> • 31 roadmap projects; expansion of administrative information sharing and citizen participatory portals, etc. • Broadband Convergence Network (BCN) implementation plan | <ul style="list-style-type: none"> • e-Government Act, 2007 | <ul style="list-style-type: none"> • Launch Tax Information Management System (TIMS), 2003 • Launch cash recipient portal, 2005 • Launch year-end settlement portal, 2006 |
| Maturity | 2008 to present | <ul style="list-style-type: none"> • Integration of e-government; Enterprise Architecture (EA)-based convergence service, etc. • Smart e-government strategy | <ul style="list-style-type: none"> • Smart e-government strategy, 2008 • Framework Act on National Informatization, 2009 | <ul style="list-style-type: none"> • Planning and launch NTIS, 2010–2015 |

Source: Revised from Kim 2012.

Note: * The Government-for-Citizens Portal provides petition services online, such as issuance of certificates for residence, immigration entry/departure history, and tax payment.

FIGURE 8 | Development Histories of e-Tax Administration and National Strategy and Policy



“mandatory use of real names for bank accounts” (Choi and Han 2006).¹² Over the last 20 years, NTS has expanded and revised the system with additional tax services, including tax portal, cash receipt, and credit card data management, allowing citizens and businesses to access enhanced on-line tax services with cutting-edge technology. A list of Korea’s key e-tax systems and their broad development history appears in Table 5.

Next Generation Tax Integrated System (NTIS), 2015

NTS amended and finalized its business plan for NTIS in 2013. The tax service, having studied the feasibility and economic viability of NTIS, determined that plans for its implementation would need to carefully manage three key risk factors.

- *Significant financing needs:* The total investment cost was between 10 and 20 percent of NTS’s annual budget.
- *Complexity of project management:* The work involved a broad scope and a high degree of technical complexity.
- *High technological complexity:* Data migration and interoperability presented risks.

12. NTS added other systems to TIS to follow finance policy changes, such as credit card data management for “tax incentive for electronically traceable payment” in 1999, and cash receipt system for “electronically traceable cash receipt policy” in 2005, etc.

TABLE 5 | Development Histories of Key Electronic Tax Administration Systems as of 2012

| System (total 34) | Key functions | Type | Year |
|---|--|----------|--------------|
| TIS (Tax Integrated System) | Key system for NTS officials (Input, Refer, Modify Data) | Web Host | 1997 |
| NTS Homepage | Informing/guiding about NTS | Web | 1999 |
| Electric document system | Producing, sanctioning, and keeping digitized documents | Web | 2000 |
| HomeTax | Filing, tax payment, civil petition, and notification via Internet | Web | 2002 |
| TIMS (Tax Information Management) | Compiling statistics and analyzing data | Web C/S | 2003 |
| Knowledge management | Creating and sharing Information among NTS officials | Web | 2004 |
| Cash receipt system | Collecting and managing cash receipt data from all taxpayers | Web | 2005 |
| Simplified year-end tax settlement | Providing year-end tax adjustment data to wage earners | Web | 2006 |
| Tax Law Information System | Providing taxpayers with free tax-related law and ordinances | Web | 2006 |
| Others (e-Tax Invoice, RFID-based Liquor Distribution Information System, etc.) | 24 systems, including a tax consultation system | Web | 2000 to 2006 |

Source: Korea, NTS 2012c.

TABLE 6 | Summary of the NTIS Project

| Project information | Description |
|--|---|
| Objective | Flexible and integrated system |
| Project duration | 2010 to 2015 (5.5 years) |
| Budget | About US\$200 million |
| Average monthly manpower involved in the project | 360 people per month |
| Key scope of work | Integrated Administration System (NTIS) and DB Integrated service system (HomeTax Portal) |

Source: Korea, NTS 2012c.

In the consideration of the risk factors, the plan was implemented with the following requirements:

- The system should provide one integrated tax system for management efficiency, information resource management integration, information compatibility, and service channel integration.
- The system should be developed and implemented as a single project (“Big-Bang” approach) to avoid duplication of investment and to integrate and harmonize all subsystems.
- The project should be executed in several phases in the consideration of the government’s budget plan, risk factors, the technological complexity of system development, integrity of data, and availability of resources to be involved in the project.

NTIS has no independent, stand-alone service portals or systems; rather, it offers external users an integrated taxpayer service portal and internal users the NTS single-window portal. These integrated portals and systems allow for citizens and businesses to access various tax services through a one-stop external portal, while government officers gain access through a single-window, internal portal. (For further details on TIS and NTIS, see Appendix 2.)

Organizational Reform and Restructuring to the Functional Model in the NTS

Reorganization of the NTS

In 1999, the NTS began a comprehensive organizational reform, the core of which was transforming the management system from a “regional-based tax administration” to a “function-based” one. Previously, one official was in charge of the complete taxing process for taxpayers in a specific region. For instance, one VAT official had control of every process related to VAT taxation in that district, including filing, payment, collection, tax assessment, tax audit, and so on. This method was time consuming, gave rise to simple errors, and introduced the potential for corruption, as information could be accessed only through the tax official in charge.

After the reorganization, a single tax officer performs only one specific taxation function, not the entire process. One officer takes charge of tax reporting and collection, for example, while others carry out investigation or management of tax sources. This reorganization by function was necessitated by Korea’s rapid economic growth and development; the resulting sharp increase in tax affairs made the traditional system infeasible.

Function-based task management improved the professionalism and efficiency of the administration through division of labor. Moreover, eliminating personal relations between tax officials and taxpayers helped reduce opportunities for corruption, thus contributing to transparency. Despite some opposition to change within the NTS, these arguments carried the day. In the aftermath, many issues remained to be tackled, including complaints from tax officers who had instantly lost discretion over tax settlements. Moreover, since the TIS had computerized most tax administration tasks, staff unfamiliar with computerized work disliked the changes.

The most direct and strongest opposition to the organizational restructuring, however, came from officials responsible for filing and paying taxes at the end of functionalized tasks. These officials had to manually insert tax return data supplied by taxpayers into terminals connected to the TIS, repeating this monotonous tax collection work nearly every day. In addition, considerable hours were spent doing simple jobs, such as sending mail. These role changes resulted in many complaints, since these low-skill tasks were monotonous and unrewarding compared to their previous roles as knowledge workers. Some employees even applied for early retirement.

Unsurprisingly, therefore, the NTS leaders quickly realized that an Internet-based electronic filing system was the best option for resolving these problems. In their view, development of a digital tax service like HomeTax was vital for successful reorganization. This compelling business case led NTS leadership to accelerate efforts to develop the HomeTax system.

Tax Administration Reform in 1999

During the late 1990s, a new concept of tax service emerged in Korea. Until then, tax administration had been considered a stronghold of government power. The new idea emphasizing “services” in taxation can be traced back to the New Public Management principle,¹³ which reinforced tax collection service and led to corresponding changes in the tax administration system; this was the role model for Korea’s 1999 NTS reforms. After the Foreign Exchange Crisis of 1997, the government initiated a systematic plan for deregulation and economic opening and made significant structural amendments in the financial and public sectors, which exerted pressure for reform. Furthermore, Korea’s first horizontal transfer of political power in 1998 put force behind the drive for reforms, as the Kim Daejung administration (the “People’s Government”) had to deal with rocketing social demands. Increasing public awareness made the government realize that taxpayers should not be treated as mere passive recipients of tax administration regulations but as autonomous and active citizens in the system (Korea, NTS 2015). More powerful and direct pressure for NTS reform came from within. As the public began to demand more transparency in the tax collection and administration process, the NTS was forced to launch reforms to resolve structural problems.

The NTS reform in 1999, by setting its main goals as enhancing transparency and efficiency in the administration and improving taxpayer convenience, brought about a paradigm shift in tax administration. The financial and human resources saved through organizational restructuring were reallocated to improving taxpayer service, creating the Bureau of Taxpayer Support and Taxpayer Protection Officers. In addition, the 1999 reform led NTS to step up its efforts to make significant progress in e-tax administration, including HomeTax service registration as an upgraded tax service. Automation and computerization were key during this period. The Electronic Data Interchange (EDI) was established in 1998 to collect tax data online. A nationwide intranet within the NTS also started in 1999, dramatically improving efficiency and productivity in tax administration. The HomeTax service started in 2001, and the NTS began communicating with taxpayers via e-mail newsletters in 2003. The NTS Call Center, widened and reformed in 2003, became the National Tax General Call Center, providing improved quality of service to callers seeking information, clarification, and answers to tax questions.

13. Beginning in the early 1980s, the tax administration reform founded on the New Public Management philosophy that began in English-speaking countries was being copied and adopted in many others. The old tax administration organization, based on tax categories, was reorganized based on tax functions, as in New Zealand or Singapore, or taxpayer types, as in the United States, the United Kingdom, and Australia. All of these changes resulted in better tax payment service, and in addition, the national tax administration organization was reduced in size, for example, by closing local tax collection offices (Kim 2001).

The HomeTax Service of Korea: An Example of Good Practices in ICT-Based Taxpayer Services

This overview of the HomeTax Service (HTS) examines the main drivers and challenges it faced, as well as its performance and success factors.

Background and Results

The HTS began in 1999 as a natural product of tax administration reform, which aimed to improve not only taxpayer convenience but transparency and efficiency in tax administration as well. The NTS actively participated in developing the HTS because automatic input of tax information was essential to using the TIS. The direct computer input of data for tax returns and payments was necessary to place internal personnel effectively after the NTS reorganization of the late 1990s.

The HomeTax service provides many benefits in terms of user convenience and administrative efficiency. With the TIS and taxpayers networked together through the HTS, tax services are more readily available and convenient than before. HTS saves taxpayers significant time and monetary costs because they can deal with tax matters via the Internet without needing to visit a tax office. Better service quality helps reduce the costs of tax compliance and improves taxpayer satisfaction. With the help of the Internet environment, HTS facilitates faster processing because tax officials do not need to enter taxpayer information manually. Tax authorities can improve the accuracy, promptness, and efficiency of tax administration and reduce administrative costs because errors in tax returns are reduced; personnel in charge of related tasks can be assigned to other taxpayer services. In addition, as it becomes possible to handle all tax payment procedures on the Internet, the transparency of the tax administration can be enhanced and the rate of filing tax returns and making payments increases. HTS thus also helps to suppress tax evasion, expanding tax revenue.

The pace of HTS adoption is quite impressive. As of 2015, the rate of filing electronic tax returns was 90.0 percent for VAT, 91.0 percent for global income tax, 98.6 percent for corporate tax, and 98.9 percent for withholding tax. The number of online tax returns was 22 million, 93 percent of the total tax returns filed in Korea. Those high rates can be attributed to user satisfaction with the HTS and its compliance cost savings for taxpayers. As an example, NTS analysis shows that in 2008 taxpayers saved approximately KRW 400 billion (US\$400 million) using the HTS, and NTS administrative costs were reduced by approximately KRW 150 billion. Such opportunity costs are saved every year. (See the section “Reduced Costs of Tax Compliance” below.)

As mentioned above, more than 90 percent of Korean taxpayers now file and report their taxes on the Internet.¹⁴ Before electronic tax services were made available, taxpayers usually went to the tax office for all tax-related tasks, including delivering their tax return. The manual tax-filing system leads to

14. 2015 *Statistical Year Book of National Tax*, Korea, National Tax Service 2015.

errors, lower efficiencies, and higher compliance costs. Unnecessary administration costs can also be incurred owing to duplicate or omitted tasks in the manual processes. In addition, when the tax administration is not transparent enough to prevent corruption, face-to-face contact between tax officials and taxpayers creates opportunities for rent-seeking behavior.

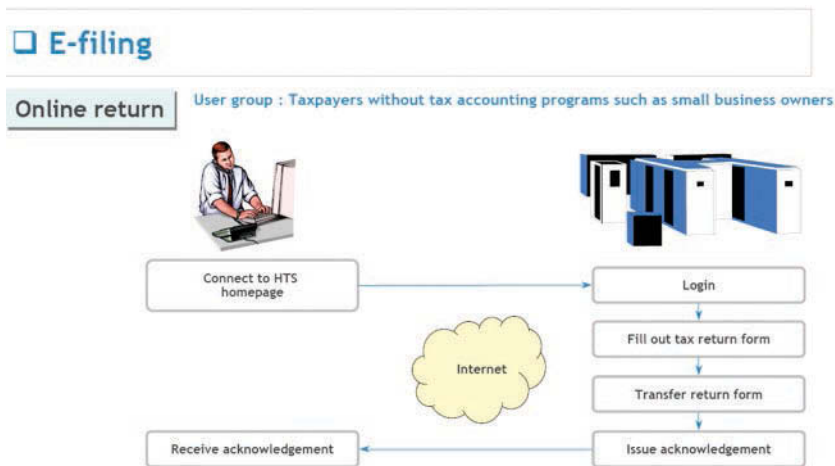
Outline of the HTS

The HomeTax service is Internet based and allows taxpayers to deal with tax-related tasks regardless of time and place; it encompasses e-return, e-notices, e-payments, e-civil service, and other features. HTS furthered a major government plan to upgrade the quality of government service and strengthen transparency and efficiency in tax administration (Han 2008). The ultimate intention behind it is to create an ubiquitous environment, including mobile infrastructure, that facilitates taxpayers' access to services at their convenience (Han 2008). HTS development occurred in two phases. The first focused on online billing and payment for VAT and issuance of certificates, for example, for business registry and tax payment. The second addressed problems with the first phase to improve the HTS experience.

E-Return (E-filing)

E-return (also known as e-filing) involves creating various tax returns and attached documents on a PC and then transmitting them to the HomeTax system through the Internet. E-filing started in 2000 with VAT and withholding tax returns before it was extended, in stages, to cover other taxes: in 2002 to cover five types of indirect taxes and two types of surtaxes, and in 2004 to cover direct taxes.¹⁵

FIGURE 9 | E-Filing



15. E-filing service started in July 2000 and was limited to VAT and withholding tax returns for taxpayers in Seoul; it became available to all taxpayers in Korea in July 2002. In November 2002, the service expanded to five types of indirect taxes (consumption tax, liquor tax, securities transaction tax, stamp tax, and transportation tax) and two types of surtaxes (education tax and special taxes for rural development). In 2004, e-filing became serviceable for direct taxes (personal income tax and corporate income tax) as well. (For more details about the HTS see Korea, National Tax Service 2011a and 2011b.)

Taxpayers have two options for filing tax returns online. They can fill in forms supplied by HomeTax, which also provides automatic tax calculators for easily summing up taxes, or they can use a commercial tax accounting program to complete the forms, convert the forms using the NTS-distributed conversion program, and send them to the NTS through the HomeTax.

E-Notice

Before HomeTax, the NTS sent tax notices by registered mail, which was costly and inconvenient, because recipients had to be present when the mail arrived. To resolve this problem, the NTS provided an online “e-notice.” Using e-notice, the taxpayer receives a message via the Internet or a mobile service and confirms the contents of the tax notice on the HomeTax homepage.¹⁶ This is legally effective under the NTS Electronic Notification System for matters including the tax amount imposed on a taxpayer, tax payment due date, and so on. After receiving the text or e-mail notice, taxpayers can check the details by logging onto HomeTax. HomeTax currently sends several types of notices, including on tax assessment/payment, tax bills, and announcements of the credit card lottery winner.

Currently, the Framework Act on National Taxes (FANT) provides the regulations and legal grounds for electronic notices.¹⁷ Taxpayers apply for e-notice service¹⁸ and no longer receive written notices.¹⁹

E-Payment

The Electronic Payment System allows taxpayers to pay invoiced taxes via the HTS without visiting a financial institution in person. The e-payment was first made available in April 2002 for preliminary VAT payments. It was extended to all tax types by June 2002. The system allows taxpayers to transfer payments from an account, use a credit card, and so on. When taxpayers finished e-filing, HomeTax automatically leads them to the payment screen, where payment is made by entering the bank name and account number and password.

In accordance with the Act on Submission and Management of Taxation Data, enacted in July 2000, local governments, financial institutions, and business organizations are compelled to notify NTS of 92 kinds of taxation data. Thus, financial information was integrated into the NTS information system, taxpayers no longer had to input bank information, and the accuracy of data was further enhanced.

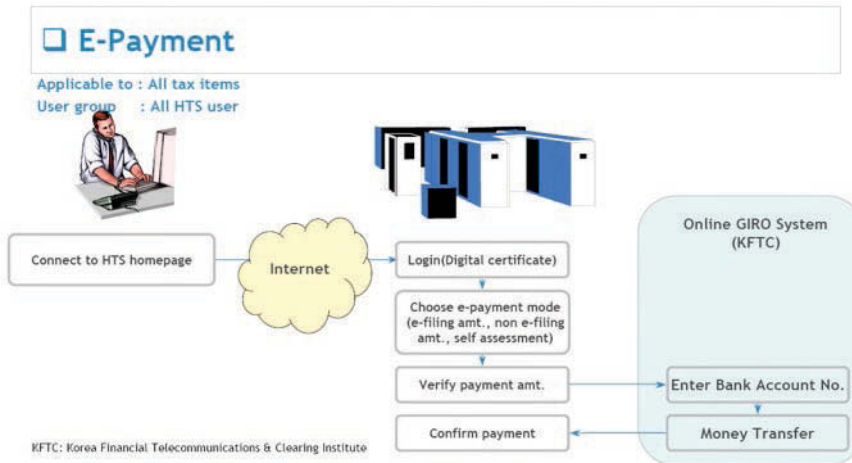
16. <http://www.hometax.go.kr>. E-notice service began in April 2002 and by June 2002 it extended to all tax types. In November 2002, e-notice applied to the residence tax. In December 2002, a new legal underpinning for e-notice was introduced (FANT, Article 12).

17. Method of Service of Documents, Article 10; Method of Document Delivery and Application for Electronic Service, Article 6-2 of Enforcement Decree.

18. Electronic service is provided only if a person authorized to receive the documents files an application as prescribed by Presidential Decree (Article 10, Paragraph 8 of FANT).

19. When someone wanted to receive documents in writing, they had to fill out the “Internet Tax Service Application Form (withdrawal)” and submit it to the head of the tax office, or follow the procedure provided on the home tax service homepage.

FIGURE 10 | E-Payment



Simplified Year-End Tax Settlement Service

Before the Simplified Year-end Tax Settlement²⁰ Service was introduced, year-end tax settlement was cumbersome, time consuming, and costly. For wage and salaried workers, claiming income deductions or tax credits involved visiting hospitals, education facilities, or financial institutions to obtain payment receipts and then submitting them to withholding agents. Moreover, compliance costs were borne by the institutions providing the payment records and by the withholding agents who verified and stored the receipts submitted by taxpayers.

To address these problems, in 2006 the NTS started to collect payment records directly from hospitals, schools, or financial institutions through IT networks and began to provide the information required for claiming income deductions or tax credits on the NTS website. Taxpayers were able to visit the website to view thirteen different deduction and tax credit items, including insurance payments, medical and education expenses, credit card use, pension savings, and home purchase savings. Salaried taxpayers can now make year-end tax settlements in a simpler and more accurate way by using e-filing.

Online Submission and Issuance of Tax Related Document

Online submission of tax-related documents was initiated in November 2001 for tax-exemption documents related to the special consumption tax. In November 2002, HomeTax allowed taxpayers to submit 109 types of submission forms online. In 2003, the service extended to various tax-related documents, and in 2005 it covered statements of liquor sales. Moreover, in November 2002, the NTS made it possible for taxpayers to apply for tax documents more conveniently and quickly using the Civil Certification Internet Access Service, including in 2004 the use of a personal PC. In January 2004

20. The year-end settlement is similar to the U.S. tax return system (Form W-2). The NTS refunds or gives additional payment of the difference between the actual tax (decision tax amount) after subtracting various deductions, etc., from the tax and the settlement of one year after having already withheld these from the monthly salary of February of the next year (quoted from Wikipedia and National Tax Service).

the NTS started its e-issuance service with six types of certificates (including the business registration certificate and the tax payment certificate), extending it to 10 more types in March 2004 and 17 more in May 2004. Today taxpayers can print out 33 types of certificates from their PCs at home. The NTS also enables the taxpayer to inquire about various contents, using the HomeTax service to confirm tax returns. Inquiry services available through the HomeTax are summarized in Table 7.

TABLE 7 | List of Inquiry Services Using the HomeTax Service

| | |
|---------------------|--|
| Tax return enquiry | <ul style="list-style-type: none"> • Withholding tax • VAT • Comprehensive income tax • Payment statement • Income tax from asset transfer |
| Tax payment enquiry | Tax payment |
| Other enquiries | <ul style="list-style-type: none"> • Business registration status • Refund • Tax point • Income tax intermediate payment • Income amount • National pension premium • VAT notification tax amount • Taxation type conversion • Local company number • Corporate tax intermediate payment • Credit card sales data • Comprehensive real estate tax taxpayer identification • Tax agency information management • Business account reporting status • Liquor license status |

Each document has its own issuance number, and the taxpayer need only give this number to a company or organization requiring it. These parties can view the document, using the issuance number, by logging onto HomeTax. HomeTax offers 14 types of tax-related documents, including certificate of business registration, certificate of tax clearance, and certificate of business suspension/closure. This considerably reduces taxpayers' need to visit tax offices to request papers.

Calculation and Data

HTS provides tax calculation services to help taxpayers on issues relating to daily life. These include automatic calculation of income taxes from asset transfers, confirmation of tax exemption for income taxes from asset transfers, and automatic calculation of gift taxes. In addition, taxpayers can submit various kinds of taxation data through HTS that had previously been submitted directly in writing or using a computer forms. Table 8 lists the taxable data that can be submitted using HTS.

FIGURE 11 | E-Civil Service

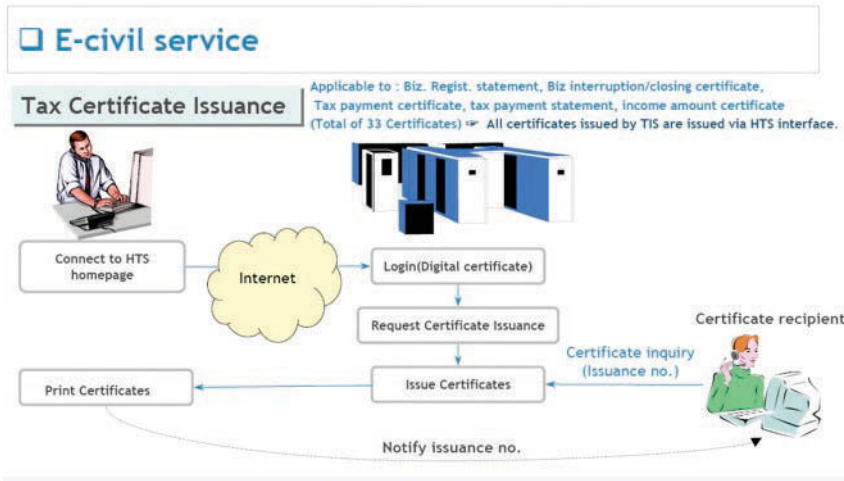


TABLE 8 | Taxation Data Inputs by the HTS

| | |
|--|---|
| Taxation data | <ul style="list-style-type: none"> • Daily working income payment statement • (Work, retirement, etc.) payment statement • Liquor sales record • Tax exemption for passengers • Golf membership transfer record • Taxation materials of business place provider, etc. |
| Non-profit and tax-exempt corporation taxation data submission | (Tax) invoice |

Main Drivers and Challenges

Legal Framework

A legal foundation had to be prepared for regularization of the HomeTax service. In June 2000, the NTS issued a notice on the use of e-filing, under the name “Regulation on the Use of HomeTax,”²¹ expanding the HTS. In November 2002, the Framework Act on National Taxes (FANT) was modified after internal discussions among tax authorities. To ensure the system’s lawfulness before the FANT modification, the Regulation on Using Tax Service by Internet was temporarily put in place.²²

Cooperation among Various Organizations

Before the introduction of e-tax administration, local governments, financial institutions, and business organizations collected and managed tax data on their own. Government officials and taxpayers had to

21. Pursuant to paragraph 18 and paragraph 19 of Article 2, Article 5; paragraph 2 of Article 5, Article 8, Article 10; paragraph 1 of Article 12; Article 85 of Framework Act on National Taxes; paragraph 3 of Article 1, Article 2; paragraphs 2, 3, and 4 of Article 6; paragraph 5 of Article 65 of Enforcement Regulations of the same Act; chapter 2 of e-government Act, Article 1; and paragraph 2 of Article 3 of Enforcement Rules of the same act (Article 7 to Article 15), contents about home tax use and requirements are announced as “regulation on home tax use” (Notice by National Tax Service No. 2016-4).

22. National Law Information Center, Ministry of Government Legislation.

go through cumbersome procedures to receive data from other organizations. To integrate tax information via the TIS or the HTS, the NTS first had to gain the cooperation of the relevant institutions and organizations. Since then, many organizations have been involved in implementing the HomeTax service under the lead of National Information Society Agency. Eventually, the Korea Financial Telecommunications and Clearings Institute (KFTC) and many banks took part in building up the e-payment system.

Technical Problems

Since the TIS was established in 1999, the tax administration information system has expanded to include various kinds of e-tax systems, such as the HTS, TIMS, e-sero, and NTIS. The main concerns in the beginning were how to connect HTS with financial institutions for tax payments and to make systematic use of the information in the TIS. To address these, the NTS found an effective and secure solution (Korea, National Tax Service 2015).

1. E-payment system in connection with financial institution

E-payment already existed through a payment gateway (PG), the KFTC, or the banks, but each had costs associated with using them.²³ Problems cropped up as the government lacked a legal basis for assuming the payment fees related to tax collection. The cost of establishing a separate system linking all domestic commercial banks with different data systems would have been enormous. The Internet giro system offered by KFTC as an alternative also had problems in terms of protecting personal information. These two obstacles were overcome through the cooperation of the KFTC and NTS to find a way to legally pay taxes online while protecting user information.

2. Linkage of integrated national tax system and HomeTax

HTS often uses the TIS data, which also raised the issue of protecting personal information transmitted over the Internet. In response, the NTS devised disk-based data transmission²⁴ to back up data among systems, enabling real-time basis data transmission to the HTS.

The NTS also developed a new system to help their staff perform complex and diverse analytical work in the rapidly evolving digital smart technology environment. Building an interactive portal became inevitable; the system would have to accommodate multitasking by taxpayers and officials and integrate more than 30 distributed basic individual systems into one. In 2010, the NTS started work on its next generation project, which became NTIS.²⁵ Run on JAVA, the program was modularized to use similar functions jointly. In addition, it confirmed the user interface and development standard. Problems with system compatibility and homepage access due to the use of different servers, commercial software,²⁶ and DB management systems were eliminated.²⁷ While building NTIS, the NTS renovated

23. Currently, it still generates the costs from taxes paid for using PGs, even if there are dozens of PGs.

24. Please refer to Korea, National Tax Service 2015 for details.

25. To accomplish this, it signed a long-term project contract with Samsung SDS Consortium in July 2013, with a second phase for program development and hardware and software infrastructure building. The project target date was June 2015 and the project period was divided into three divisions.

26. Unix, mainframe, and Windows NT.

27. Oracle, DB2, Sybase.

its entire process for generating and disposing of data by setting up its Data Quality Management System²⁸ to manage the data life cycle and eliminate system slowdown or errors due to accumulated data.

Security Issues

At the early stage of service, users had to visit the tax office and go through an identification process, and the online system had to deal with identification issues without compromising personal information protection. A related issue was security for HomeTax users. Introduced in October 2002, the solution was to allow HomeTax users to join the HomeTax homepage on the Internet through official certification (Korea, National Tax Service 2015). The NTS chose the certified authentication system, despite its inconvenience,²⁹ to strengthen personal privacy. This approach was easily accomplished as it had already been used by other services.

Interlinkage with Other Institutions

The MoSF already had an electronic bill presentment and payment (EBPP) service before HTS was introduced. Therefore, the roles were allocated for taxpayers' increased convenience to remedy the problem of overlapping of investment and information.

The option of linking the KFTC giro system with e-payment was chosen because it made payment faster and more convenient. The possibility existed, however, that transmission of real-time payment information would be delayed or hindered by data system instability. The data systems of the KFTC and the banks are often crowded and overburdened when meeting end-of-month deadlines. Cooperation on data exchanges among institutions and expanded system coverage helped alleviate this issue.

Performance and Assessment

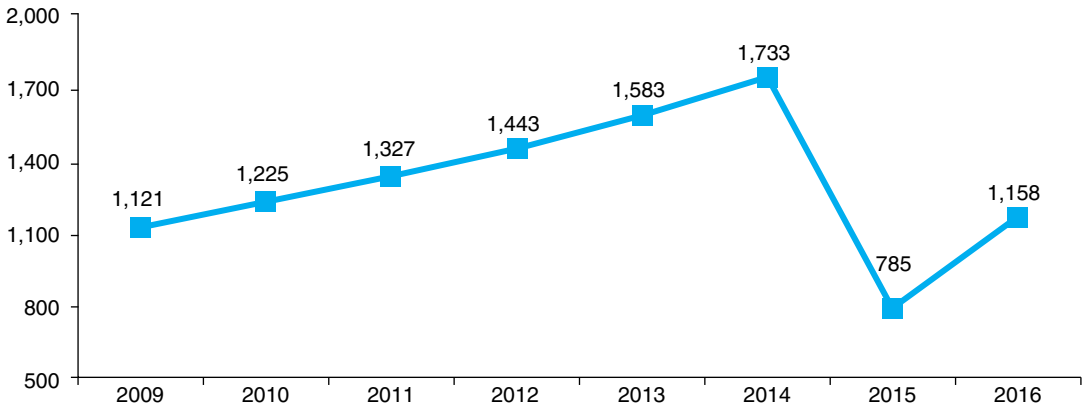
Adoption of the HTS

Following its 2002 initiation, HTS did not attract many taxpayers: only 13.7 percent of VAT returns were filed online in January 2003. NTS made significant efforts to promote wider use of e-filing, increasing the rate to 74.1 percent by 2008. Numbers of HTS users have continuously increased, and visitors to the site have dramatically increased. Korea's e-filing through the HomeTax portal ranks highest in the world for its unique, diverse, and useful services, such as the non-taxation certification for single-home-owning families and customized tax information services (such as access to income and withholding tax information). The HomeTax system began offering services in April 2002, and by July 2006 its homepage had been visited by 100 million people. By July 2009, this number had increased to 300 million. The number of HTS subscribers was 11.2 million in 2009 and 17.33 million

28. In building the NTIS, 405 basic servers were integrated into 102 servers, the DB management system was unified with DB2, and 82 types of software (for system security and so on) were incorporated.

29. Taxpayers cannot access HTS without certain types of electronic certificate accepted by the system. Most people were issued this certificate from the bank for their e-bankng.

FIGURE 12 | Number of Subscribers (unit: 10,000 persons)



Source: Korea, NTS 2016b, *Taxpayer Services in the HomeTax System Annual Report: National Tax Service of Korea 2006–2016*.

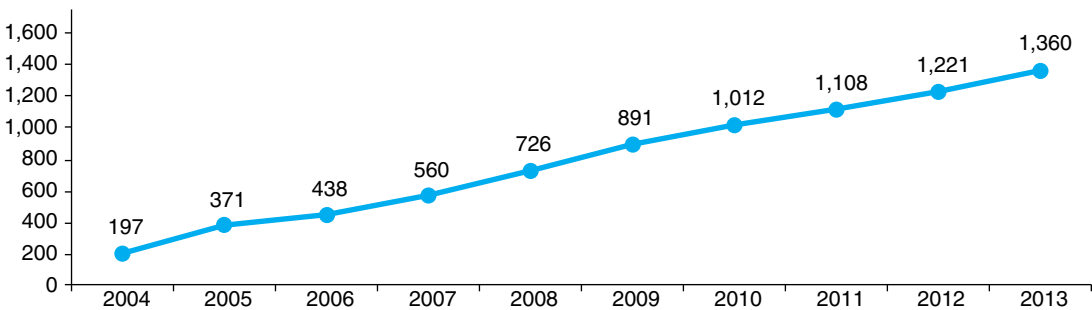
in 2014, preceding NTIS in 2015. With the new system’s introduction in February 2015, the number of users, faced with re-entering or re-adapting to a new system, sharply decreased, to 7.85 million.

Apart from the ability to e-file and e-pay, both typically offered in other countries, the HomeTax system offers a broad range of services, including e-issuance of tax-related documents embedded with fraud prevention technology. Taxpayers can request and receive tax-related documents online, which can be downloaded and printed for official use. This service became available in August 2004, with 33 different types of certificates available, and was used to issue 52.8 percent of tax-related certificates. Later, in 2013, the share of online certificate issuance rate increased to 72.7 percent.

Now, 15 years after the HTS was first introduced, e-filing is widely used in Korea. In 2015, the electronic tax return rate showed 90.0 percent for VAT, 91.0 percent for global income tax, 98.6 percent for corporate tax, and 98.9 percent for withholding tax. In addition, the number of online tax returns was 22 million in 2015, equivalent to 93 percent of the total tax returns filed in Korea.

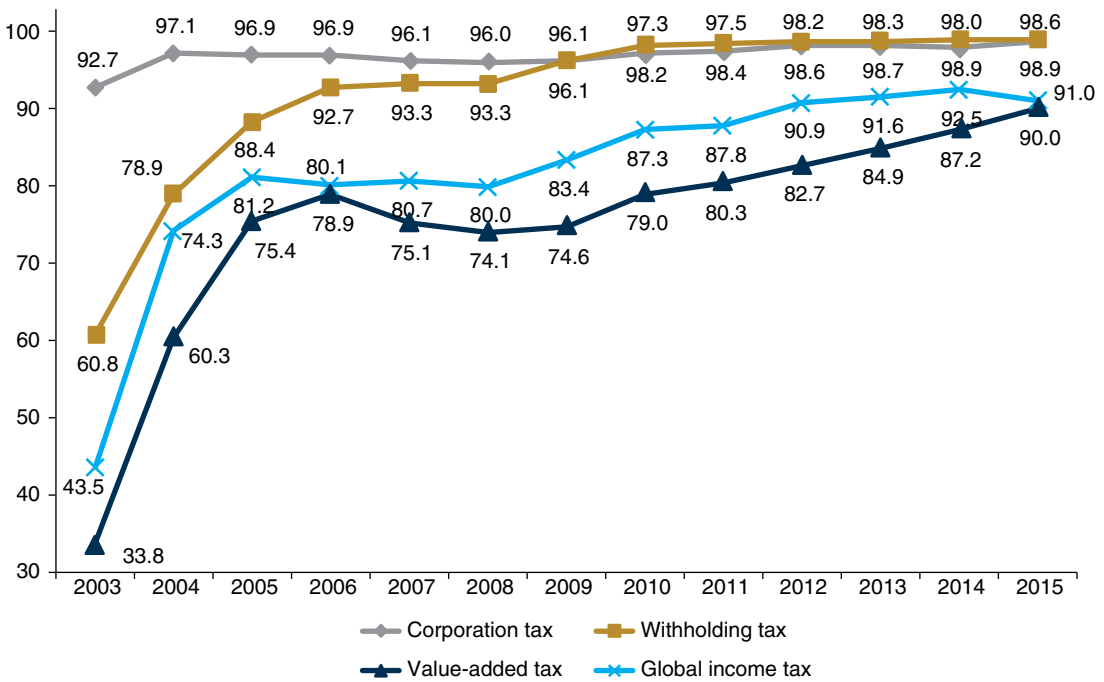
The high rate of HomeTax use indicates that the administrative system, once a typical paper-based system, has achieved significant savings under the electronic system, thus benefiting Korean citizens.

FIGURE 13 | Number of Tax-related Documents Issued Using the HTS (unit: 10,000)



Source: NTS, *Annual Report, National Tax Service of Korea 2006–2016*.

FIGURE 14 | Proportion of Tax Returns Filed Electronically: 2004–2016 (%)



Source: *Taxpayer Services in the HomeTax System Annual Report: National Tax Service of Korea 2006–2016*.

In February 2008, the HTS achieved ISO/IEC20000 certification, highlighting its efforts to improve the quality of services for taxpayers.³⁰

In the 2015 Forum on Tax Administration (FTA)³¹ report on e-filing and pre-filing, noted 2004 income tax filing in the United States was 47 percent and in the Republic of Korea was 43 percent, while the OECD average was 31 percent. After a gradual increase in 2013, the United States was at 83 percent, Korea at 91 percent, and the OECD average was at 72 percent. In terms of corporate tax, in 2004, Korea’s rate of e-filing was over 90 percent, and it reached 98 percent by 2013. The rate in Korea is as high as the United Kingdom’s, the most advanced country for e-tax administration use, and twice the rate of the United States. Moreover, as of 2013, Korea showed the highest rates of partially pre-filled returns for VAT and income tax: 83 percent and 82 percent, respectively.

User Satisfaction and Tax Compliance

User Satisfaction and Work Efficiency

The NTS conducts annual surveys of HTS user satisfaction. The questionnaire targets taxpayers who use the HomeTax service and is conducted on the HTS homepage. It focuses on the convenience of e-filing,

30. *HomeTax System Annual Report 2011*; Korea, NTS 2015.

31. The FTA was created in 2002 by the OECD as a tax administrative forum for 46 OECD countries and includes G20 countries and non-OECD countries. Through this forum, studies have been conducted and published on increasing efficiency and fairness in tax administration and reducing compliance costs.

TABLE 9 | NTS Survey: Taxpayer Opinions on HTS e-Filing Services

| Year | Period | Tax | Number of e-filing users surveyed | Rate of overall satisfaction with the e-filing services of the HTS |
|------|----------------------|---------|-----------------------------------|--|
| 2012 | 1.3~1.20 (18 days) | VAT | 111,870 | 82.3% |
| | 3.6~3.31 (26 days) | CIT | 4,378 | 75.6% |
| | 5.10~5.20 (11 days) | PIT | 101,817 | 75.9% |
| 2013 | 1.7~1.21 (15 days) | VAT | 81,519 | 82.7% |
| | 3.5~3.31 (27 days) | CIT | 8,329 | 74.8% |
| | 5.10~5.19 (10 days) | PIT | 106,052 | 73.6% |
| | 7.3~7.20 (18 days) | VAT | 52,147 | 82.3% |
| 2014 | 3.5~3.31 (27 days) | CIT | 5,143 | 80.9% |
| | 5.12~5.21 (10 days) | PIT | 158,991 | 71.3% |
| | 7.7~7.22 (16 days) | VAT | 62,884 | 83.0% |
| 2015 | 6.9~6.23 (15 days) | PIT | 7,204 | 80.2% |
| | 7.14~7.27 (14 days) | VAT | 68,707 | 86.6% |
| | 10.5~10.19 (15 days) | Overall | 21,219 | 78.77%* |
| 2016 | 10.5~10.19 (15 days) | PIT | 9,315 | 86.5% |

Source: Data provided by the Division of Information Development and System Operation of the NTS.

*Represents overall satisfaction with various services of the HTS.

the ease of filling in the required forms, and the reliability of response to inquiries about the HTS. In almost every year, the rate of overall satisfaction with VAT e-filing has been high compared to other tax items. In 2015, various services of the HTS scored the rather high rate of satisfaction of 78.77 percent.

Other surveys on HTS user satisfaction have all found high levels of taxpayer satisfaction.³²

Effects of the HTS on Tax Compliance

Bae (2010) examined whether adoption of the HomeTax service promoted tax compliance. Using the e-filing user satisfaction survey, Bae analyzed the relationship between user satisfaction and taxpayer compliance.³³ According to the main findings, overall satisfaction with the HomeTax system showed significant effects on taxpayer compliance at the 1 percent significance level.

TABLE 10 | Effects of Overall Satisfaction on Tax Compliance

| | Coefficient | t-value |
|----------------------|-------------|---------|
| Overall satisfaction | 0.850* | 23.974 |

Source: Bae 2010.

*Significant at the 1% significance level.

32. See, for example, Shim and Song 2005; Bae and Shim 2008.

33. The survey was carried out by interviewing 318 tax agents based on questionnaires.

TABLE 11 | Impacts of User Satisfaction by Service Area on Overall Satisfaction

| | Coefficient | t-value |
|-------------|-------------|---------|
| Reliability | 0.349* | 7.219 |
| Convenience | 0.213* | 3.397 |
| Usability | 0.064 | 0.929 |
| Economy | 0.185* | 3.123 |
| Security | 0.218* | 3.257 |

Source: Bae 2010.

*Significant at the 1% significance level.

Those results imply that overall user satisfaction can help tax authorities to induce voluntary taxpayer compliance. The regression analysis revealed that user satisfaction with the HTS relating to “reliability,” “convenience,” “economy,” and “security” significantly influenced overall satisfaction. Satisfaction with four out of five service areas supported overall satisfaction.

Reduced Costs of Tax Compliance

Tax compliance costs are those borne by taxpayers in meeting the demands of the tax laws and taxation authorities; they do not include the actual tax paid or any excess burden resulting from lack of neutrality in the taxation system.³⁴ Taxpayers tend to recognize the tax burden as the sum of the tax to be paid plus tax compliance costs. Compliance costs can generally be divided into internal costs, incurred in the course of preparing and submitting tax-related data, and external costs, paid to external experts, such as tax agents, in relation to tax matters (Kim, Sung-gil, and Pyung-jo 2008).

The NTS White Paper on the HTS (2011b) reported that taxpayers could save approximately KRW 300 billion (US\$300 million) by using the HTS. Reduced compliance costs were calculated based on the HTS use in 2006, the average hourly rate in 2005 (KRW 7,865 per hour), and the cost of a roundtrip visit to a tax office (KRW 5,000). Similarly, administrative cost reductions were estimated at KRW 116 billion (US\$100 million); in 2008, repeating these calculations, the NTS estimated a reduction of approximately KRW 150 billion in administration costs based on personnel expenses, printing costs (for tax notices, tax returns, and application forms, and so on), and mailing costs. Taxpayers also benefit by saving KRW 400 billion per year for transportation and opportunity costs for labor (Korea, NTS 2011a). In 2013, the NTS reported saving KRW 220 billion in 2012 due to increased e-filing and online certificate issuance and decreased printing costs. Moreover, taxpayers’ transportation compliance costs were reduced by KRW 610 billion. Such reductions in tax compliance costs can have the

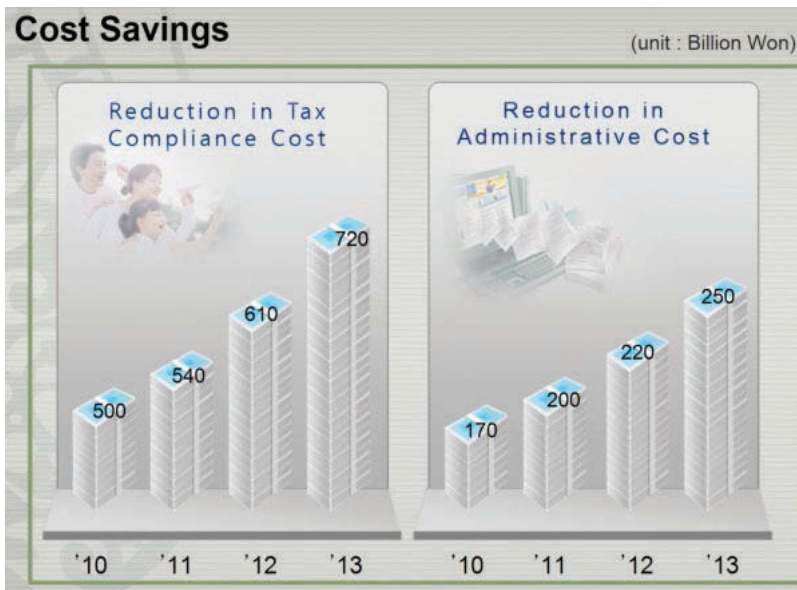
34. Because of the existence of the tax system, the public sector also spends considerable costs, which is called tax administration cost. Tax administration cost comprehensively includes the costs associated with the legislation of the tax-related laws, the costs related to the enforcement of existing tax laws, and the costs of interpreting tax laws and resolving tax-related disputes (Sandford and Hardwick, 1989). Thus, the costs of the legislative or judiciary related to tax are also broadly included. The sum of tax administration cost burdened by the public sector and tax cooperation (compliance) cost burdened by the private sector due to such a tax system is called “tax operation cost.”

TABLE 12 | Reduced Taxpayer Compliance Costs and Administrative Costs, 2006
(unit: million won)

| Costs | e-filing | e-pay | e-civil service | Subtotal |
|-----------------------------|----------------|--------------|-----------------|----------------|
| Compliance costs | | | | |
| Opportunity costs for labor | 118,580 | 4,851 | 60,188 | 183,619 |
| Transportation | 75,384 | 3,084 | 38,263 | 116,731 |
| Total | 193,964 | 7,935 | 98,451 | 300,350 |
| Administrative costs | | | | |
| Personnel expenses | 86,558 | 730 | 21,967 | 109,255 |
| Mailing | | 379 | | 379 |
| Paper | 4,523 | 76 | 2,396 | 6,895 |
| Total | 91,081 | 1,185 | 24,363 | 116,529 |

Source: Korea, NTS 2011.

FIGURE 15 | HTS Effects on Cost Reduction



Source: Korea, NTS 2016b.

same effect as tax savings. Note that tax compliance costs increase as inflation gradually increases and as the number of system users increases. The costs are also likely to decrease as the system evolves.

Since its adoption in 2006, the simplified year-end tax settlement service has been a cost-effective measure to dramatically reduce the time needed to collect receipts. According to a study by the Korea Institute of Public Finance, compliance costs for collecting and providing records were reduced by KRW 947.5 billion in 2010 alone thanks to the service (KIPF 2011b). Many users find the service convenient, and the number of users of the simplified service has increased over the years, along with

TABLE 13 | Number of Year-End Tax Settlement System Users
(unit: by person, by case)

| | Taxpayers | Number of contacts |
|------|------------------|---------------------------|
| 2006 | 3,394,396 | 11,004,180 |
| 2007 | 5,246,634 | 17,913,984 |
| 2008 | 7,139,619 | 23,418,639 |
| 2009 | 8,061,928 | 25,012,297 |
| 2010 | 8,766,846 | 23,402,541 |
| 2011 | 9,792,512 | 24,846,598 |
| 2012 | 10,499,488 | 25,041,102 |
| 2013 | 11,035,538 | 26,663,393 |
| 2014 | 11,445,926 | 32,352,999 |
| 2015 | 11,949,626 | 22,422,980 |

Source: *Statistical Year Book of National Tax Service 2009–2016*.

the number of contacts. Although the number of contacts temporarily declined due to inconvenience of re-entry following the transition to the NTIS in 2015, the figures are expected to recover soon.

Success Factors of the HTS

Clear Goals and Urgent Needs

One of the most important factors for the successful development of the HTS in Korea was the clear sense of purpose and need. As described above,³⁵ during the important changes of the late 1990s, developing HTS was indispensable for the active use of the TIS to establish e-tax administration and for the full-scale reorganization of the NTS. At that time, the NTS had the clear aim of creating a fully automated tax information input device for electronic declaration and payment of taxes (Korea, National Tax Service 2015). For the efficient allocation of NTS human resources, taxpayers' ability to directly insert tax information via the Internet had to be achieved. Demand for NTS reform surged after the horizontal regime change and financial crisis, and the HTS was recognized as an effective means of providing taxpayers with convenient and transparent tax administration. For these reasons, the early establishment of the HTS was accepted as a core NTS task, and great momentum was felt throughout the organization. External factors, of course, played catalytic roles, but they were not the major driving forces.

The Role of Leadership

The chief executive officers of the NTS, appointed after the early 2000s, actively encouraged increased use of the HTS. The tax authority leadership thought that, during its inception, promotion of the HTS would encourage taxpayers to use it. Promotion and increased use of HTS became the main objectives of NTS headquarters each year (Korea, National Tax Service, 2015). Without question, tax officers had

35. See the sections "Organizational Reform and Restructuring to the Functional Model in the NTS" and "Background and Results."

to promote the system. Competition among local tax offices was used to accelerate the effort. The NTS director requested local tax offices to submit goals and achievement plans. Some offices met obstacles and fell short of their goals, but others achieved more than planned and became entitled to various benefits, some for personnel. HTS use spread quickly among taxpayers in the early 2000s, and its success would certainly have been delayed without the leadership of the NTS.

Increasing the Number of Users: Publicity and Incentives

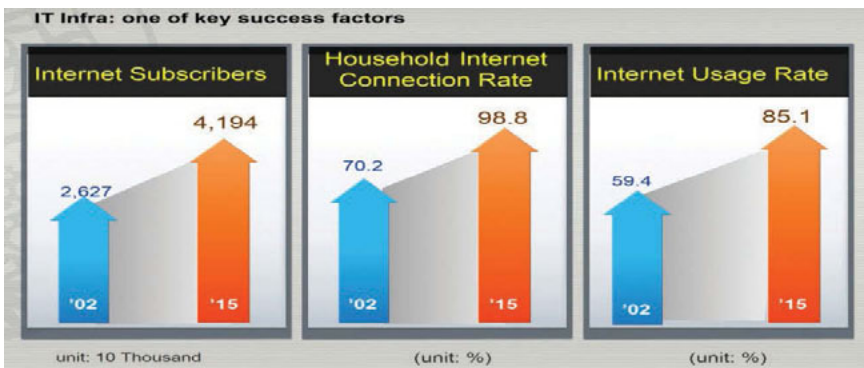
Early in the HTS project, when limited numbers of taxpayers used the system, the NTS devoted itself to public relations, including meetings with tax agents, partner associations, and others. As the scope of the HTS service expanded, tax offices initiated classes on e-filing guidance during the tax season for first-time users. To increase taxpayer participation, the NTS prepared and distributed a textbook, *The Easy-to-Use HTS*, for corporations and individual businesses. In May 2006, the NTS held a HomeTax touring event in 34 cities across the country for housemakers experiencing difficulties using the Internet or students with little awareness of the systems. In 2007, the Gangnam District Government Office held a promotional event with a “street campaign” to expand the number of HomeTax subscribers.

NTS efforts to broaden use of the HTS led to an institutional approach offering financial benefits for taxpayers who used it. In 2004, a tax credit for e-filing was legislated to help propel full-scale adoption of the HTS. Currently, individuals and corporations reporting taxes via the HTS receive a tax credit.³⁶ As a result, in 2015, the electronic tax return rate was higher than 90 percent.

Fully Developed IT Environment

Korea’s highly developed IT foundation, with significant and widespread Internet and PC use, was a key factor in HomeTax’s success. NTS drew on this technology savvy in developing its online tax services. In the 2000s, Korea already had a national broadband network, and its various social network

FIGURE 16 | Key Success Factors: IT Infrastructure



Source: Korea, NTS 2016b.

36. Taxpayers were given a tax credit of KRW 20,000 for online filing of personal income tax and corporate income tax and KRW 10,000 for VAT, while tax agents were given a tax credit of KRW 40,000 for each taxpayer for whom they prepared tax returns, up to KRW 3 million.

sites helped increase understanding of the HTS. With each Korean household PC connected to broadband Internet, taxpayers could readily access the HTS and use it to obtain necessary tax information, file electronically, or use other services. As experience with the system grew, demand for services grew as well, and the rate of online tax transactions such as e-returns and e-payments increased rapidly.

Government Efforts for E-Government

National investment to construct broadband networks in the early 2000s made Korea's Internet service widely accessible to the public and increased interest in e-government. The United Nations' 2014 E-Government Survey noted that Korea's online service index was 0.98, its telecom infrastructure index was 0.94, and its human capital index was 0.93, placing Korea first in e-government.

The main challenge for government reform following the Korean financial crisis was the increasing belief that the government should provide citizens with more diverse, higher quality public services than in the past. TIS was the first e-government policy of the Kim Dae-Jung administration (Korea National Computer Agency, 2005). The NTS, after years of effort, successfully completed the project, and this leadership in e-government policy helped smooth the transition to HTS. The project was one of the government's top 11 e-government projects in 2001 and easily secured the needed financial resources and governmental support for its legal frameworks and cooperation.

Combating VAT Tax Evasion and Fraud through Electronic Tax Invoicing

Korea became one of the world's earliest adopters of value-added tax (VAT) when it introduced a uniform 10 percent invoice-credit VAT as a general consumption tax in 1977. Since then, VAT has become a mainstay of the government's tax revenues, reaching KRW 58.9 trillion or 29 percent of all tax revenues for 2013.³⁷ The need for effective VAT enforcement—especially for curbing VAT refund frauds—remains unabated, however.

Fraud involving input VAT credit takes various forms. Businesses can, for instance, file false claims for credit by presenting fictitious invoices, inflating the credit amount using altered invoice information, claiming a zero rating for nonexistent exports or credits on noncreditable purchases, or even setting up bogus companies to issue fraudulent invoices (Keen and Smith 2007). Tax authorities are particularly incensed over VAT fraud as it constitutes both nonpayment of taxes due and theft of taxes paid by law-abiding taxpayers.

Korea's electronic tax invoice (ETI) and ETI-backed early-warning system (EWS) offers new technology-enhanced approaches to VAT enforcement and compliance. This case study reviews potential

37. Five percent of the VAT revenues were allocated to the local governments in 2013 (since 2014, this ratio has gone up to 11 percent), meaning KRW 56.0 trillion accounted for 29.4 percent of the total national tax revenue of KRW 190.2 trillion for 2013 (2014 *Statistical Year Book of National Tax*).

avenues for establishing more seamless VAT refund systems using ICT and lessons from Korea's experience combating VAT fraud, and using ETI to improve tax compliance. Korea's drive for a seamless VAT refund system remains a work in progress, but its significant success to date can aid developing countries looking to improve tax services and compliance by applying ICT to their tax administrations.

Korea's ETI Introduction

What Is ETI?

An invoice is a commercial document businesses issue to customers with the agreed price, quantity, taxes paid or owed, and other transaction information. It constitutes mutual recognition of the transaction and serves important accounting purposes. An invoice plays a particularly important role in an invoice-credit VAT regime that determines the VAT due by deducting VAT paid on a purchase from VAT payable on a sale. Businesses have an incentive to obtain an invoice for each purchase from their suppliers because they can then claim their input tax credits. Mindful of VAT claims by their customers, businesses also have an incentive to report their sales to the tax authority. Invoices therefore provide a transaction "trail" that encourages self-enforcement among businesses.

An electronic tax invoice is produced electronically and contains the same transaction information as a paper invoice. Korea's VAT rules and regulations do not specifically define ETI, but they do specify its key requirements:³⁸ (i) it must provide the names, registration numbers, and addresses of the trader and the customer, the transacted goods or services, the unit price net of VAT and quantity supplied, the applicable VAT, and the date of supply and issuance; (ii) it must be issued and transferred through the information and communication network using a "public certification system," a digital authentication program that verifies the issuer's identity and attests that the invoice was not altered; (iii) it must be issued using electronic channels designated by the Presidential Decree of the VAT Act; and (iv) it must be transmitted to the National Tax Service within a day from the date of issuance.

The "electronic channels" designated by the Presidential Decree of the VAT Act include: (i) the taxpayer's certified enterprise resource planning (ERP) system;³⁹ (ii) a certified application service provider (ASP);⁴⁰ (iii) the *e-sero* (www.esero.go.kr), an ETI-issuing website set up by the NTS, or a call to the NTS's automatic response system (ARS); and (iv) NTS-approved alternatives such as a terminal for electronically traceable cash receipts⁴¹ or credit cards. Accordingly, a valid ETI can only be transmitted through certain designated electronic channels in an electronic format with a digital signature certified by a licensed certification authority. In addition, the law requires electronic transmission of ETI information to NTS.

38. Article 16 of the VAT Act and article 68 of the Presidential Decree of the VAT Act, Korea.

39. ERPs with standard certification under the Framework Act on Electronic Commerce (FAEC).

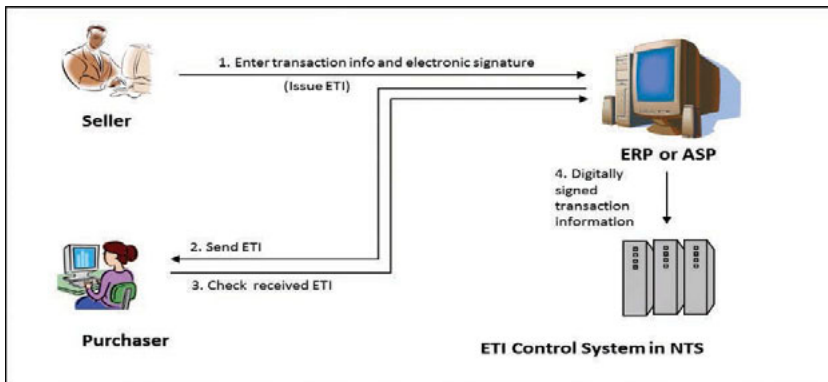
40. ASPs with standard certification under the FAEC.

41. Introduced in January 2005 to enhance the transparency of cash transactions in Korea, these receipts are produced when a customer presents an ID, a cash receipt card, or a mobile phone number to a supplier and pays cash for goods or services; the supplier issues a "cash receipt" through the cash receipt terminal and transmits the transaction information to the NTS at the point of sale.

ETI Process

In Korea, a trader connects to the electronic information system through enterprise resource planning (ERP), an application service provider (ASP), the *e-sero*, or a call to the automated response system, enters the necessary transaction information, and sends the ETI to the customer's e-mail account. The ETI information must also be forwarded to the NTS by the end of the following day. A trader who opts to use the *e-sero* or the automated response system does not need to transmit the ETI information to the NTS because the trader enters and saves the data directly into the NTS system. All ETI transaction data transmitted to the NTS via the approved channels are centrally processed by the NTS's ETI system, enabling the NTS to access transaction-level information in real time. Figures 17 and 18 explain the sequence of e-invoicing either through ERP, ASP, or the *e-sero*.

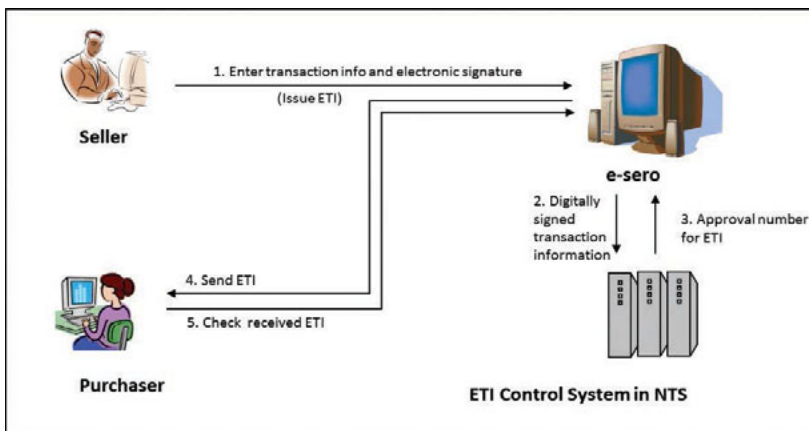
FIGURE 17 | Process of Issuing ETI through ERP or ASP



Source: Lee 2011.

Note: The diagram was modified and translated from Korean by the authors.

FIGURE 18 | Process of Issuing ETI through e-sero



Source: Lee 2011.

Note: The diagram was modified and translated from Korean by the authors.

History of ETI in Korea

Korea first introduced ETI in 1997 as an alternative to paper-based tax invoice, recognizing electronic file or electronic data storage as legally effective instruments. The Presidential Decree of the VAT Act⁴² creating ETI had only stated that “It is deemed to issue a tax invoice, if business suppliers transfer information required in tax invoices through electronic data processing systems and store the information in electronic data processing systems, electronic tapes, or diskettes.” Despite its early introduction, Korea’s ETI lacked two critical prerequisites: the authenticity of origin and the integrity of content (“authenticity and integrity”). Because electronic files can be easily altered, regulations are needed to cover identifying invoice issuers and verifying the integrity of content after a signature. Only in 1999 did the Framework Act on Electronic Commerce grant electronic documents the same legal effects as paper ones. The Act also recognized a digital signature certified by a licensed certification authority as a legally binding signature and an electronic document bearing a digital signature as an unaltered document. The same year the Digital Signature Act defined *digital signature* and established certification authorities licensed to issue digital signature certification and maintain certification records.

In 2001, more detailed tax regulations on ETI reflected legislative changes on electronic documents and digital signatures took effect.⁴³ The new regulations required ETIs to be transmitted either through the Internet via a certification system or through an information and communication network. In addition, information had to be stored electronically into a data processing system, on an electronic tape, or on a diskette. Commercial ETI-issuing companies, known as application service providers, were introduced to provide invoice services for enterprises lacking the capacity to issue their own ETIs. Guidelines for issuing and storing ETIs and related information were also released to supplement the new regulations.

With the legal and regulatory frameworks in place, one unresolved issue was to ensure the compatibility of electronic documents and digital signature formats. In 2001, discussions began on ETI standardization among private sector expert groups. In February 2004, following consultations with stakeholders including software solution developers, ETI software user companies and the relevant public institutions, the Korea Electronic Data Interchange for Administration, Commerce, and Transport Committee (KEC) endorsed XML-based ETI (Standard ETI) established by a private ETI Discussion Group. In June 2005, the Korea Institute for Electronic Commerce (KIEC) began to certify ETI issuers and service providers that passed the criteria for Standard ETI.

Despite regulatory overhaul and fine-tuning of ETI standards and certification, adoption was sluggish and embraced by only a small number of enterprises (Park and Yi 2011). According to a survey

42. Paragraph 4 of Article 53 of the Presidential Decree of the VAT Act (effective January 1, 1997).

43. Paragraphs 4, 5, and 6 of Article 53 of the Presidential Decree of the VAT Act (effective January 1, 2001).

conducted in 2002, only 1.4 percent of businesses issued ETIs and only 10.5 percent issued both ETIs and paper invoices (as cited in Oh 2002, 185). In 2008, ETI use lingered at about 15 percent of all invoices.⁴⁴

In response to the slower-than-expected pace of ETI adoption, the Ministry of Strategy and Finance proposed changes to the VAT Act making ETI compulsory, with a one-year grace period, in late 2008. Although the draft initially proposed required all corporate and designated individual businesses maintaining double-entry bookkeeping to use ETI and transmit transaction information to the NTS starting in 2010, the legislation as approved and passed by the National Assembly excluded individual businesses, requiring only corporate businesses to comply (Korea, National Assembly 2008).

In November 2009, the NTS launched a dedicated website called *e-sero*, through which taxpayers unable to issue ETIs on their own could do so for free by logging into the system. In October 2009, the National IT Industry Promotion Agency⁴⁵ began certifying standard ETIs for large companies issuing ETIs through their own IT systems and for ASPs offering ETI services to business enterprises. Preparations for compulsory ETIs were completed by the end of 2009.

The Ministry of Strategy and Finance put forth new amendments to the VAT Act giving one additional year of grace, until 2011, to small companies preparing for ETI. The amended law also imposed new ETI requirements on individual businesses whose compliance was waived during the National Assembly approval process in 2008. Individual businesses with annual sales exceeding KRW 1 billion (approximately US\$910,000) had to issue ETIs starting in 2012. After July 1, 2014, individual businesses with annual sales exceeding KRW 300 million (approximately US\$270,000) were required to issue ETIs.

Key Drivers of ETI

Strong ICT, e-Government Development and Success with Electronic Tax Administration

As mentioned in the earlier chapters, introduction of ETI in Korea is intricately intertwined with advances in Korea's ICT and e-government plans, such as TIS in 1997 for internal tax information analysis and the HTS web portal in 2002.

Onerous Requirements for Invoice Submission to the NTS

When Korea introduced VAT in 1977, it adopted an invoice control system more rigorous than any other country had attempted (Tait 1988, 280–81). Most countries that adopt invoice-credit VAT only

44. Unchan Pak, Director General of Property and Consumption Tax Bureau, Ministry of Strategy and Finance, mentioned in the Tax Subcommittee of Strategy and Finance Committee of the National Assembly in 2008 that "ETI was introduced in 1997. Approximately 15 percent of the total invoices (80 million invoices) are now issued in the form of ETIs" (Korea, National Assembly 2008, 49).

45. The Korea Institute for Electronic Commerce merged with the Korea IT Industry Promotion Agency in August 2009.

require taxpayers to store invoices as proof for their VAT filing, not to submit them when they file VAT returns. In Korea, taxpayers must not only keep all purchase and sales invoices, they must also submit them to the NTS when they file VAT returns.⁴⁶ Invoice summary lists or electronic tapes containing all transaction information from invoices was regarded as submission of the tax invoices.⁴⁷ After the NTS received paper-based invoices or transaction information, it converted the information into electronic data to cross-check the purchases and sales reported. Korea’s unique invoice control system inevitably led to increases in taxpayers’ compliance costs.

The tax authority in Korea wished to alleviate taxpayers’ burden for submitting tax invoice information without abandoning its years’-long practice of cross-checking invoices between business suppliers and customers. Opting for ETI allowed Korea both to extend its rigorous invoice control system and to lessen taxpayers’ burden, by taking advantage of state-of-the-art ICT technology. ETIs also helped lessen the NTS’s substantial burden of computerizing invoice information submitted by taxpayers.

Combating Invoice Seller Fraud

Serious tax frauds by “invoice sellers,”⁴⁸ who establish bogus companies and issue fictitious invoices to sell to businesses, did not disappear but were widespread and growing in numbers since 2000, as shown in Table 14. Starting in 2003, the NTS intensified tax investigations against invoice seller fraud through its dedicated cross-regional investigation team under its annual invoice sellers investigation plan (Korea, NTS 2003; Korea, NTS 2004). Cases of invoice seller frauds peaked in 2005 and decreased gradually, although they remained unacceptably high in 2007 before compulsory ETI was introduced in the following year.

As noted, the NTS computerized transaction information and cross-checked sales and purchases to identify any suspicious transactions, even before the mandatory ETI. But identifying suspicious

TABLE 14 | Number of Invoice Seller Charges

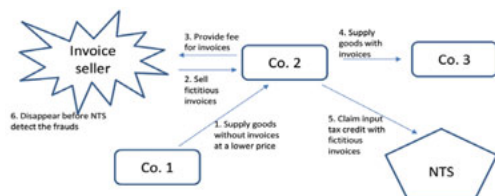
| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|-----------------------------------|------|-------|-------|-------|-------|-------|-------|-------|
| Number of invoice sellers charges | 637 | 1,065 | 1,129 | 2,108 | 3,698 | 3,725 | 1,836 | 1,702 |

Source: Data compiled by the author from Korea, NTS 2003 and Korea, NTS 2008.

46. Article 20 of the VAT Act (effective July 1, 1977).

47. Article 66 of the Presidential Decree of the VAT Act (effective July 1, 1977).

48. A basic “invoice seller” fraud is shown in the following diagram. In more complex fraud schemes, one or more buffer companies can be inserted between an invoice seller and Co. 2.



transactions took more than 18 months after the tax return was submitted. The old system of cross-checking taxpayers' tax returns by computerizing the summary lists of invoices was thus not effective against invoice sellers, who typically sold large numbers of invoices in a very short time and then disappeared. ETIs were seen as a powerful tool that digitized each transaction among taxpayers in real time and cross-checking them in advance of the VAT return. When an invoice seller issued a large number of invoices but received very few, the imbalance would be detected by the NTS in real time through "big data" analytics looking for fraud patterns. ETIs were thus expected to lessen invoice seller fraud and enhance the transparency of business transactions.

ETI Challenges and Korea's Approach

Countries gearing up to add ETI to their VAT systems face a number of critical issues. Although circumstances will vary from country to country, depending on specific tax reform objectives, the tax environment, and administration practices, Korea's experiences illustrate the critical issues governments must address. This section explores the approaches taken in Korea to ensure effective ETI adoption.

Optional vs. Compulsory

If implemented too quickly, compulsory e-invoicing can cause taxpayer resistance. Small and medium enterprise (SME) and micro businesses may lack IT capacity or be unable to bear the cost of issuing e-invoices. Even large companies may need to invest in their IT systems to comply with compulsory e-invoicing. When designing compulsory e-invoice systems, therefore, policy makers should give taxpayers sufficient time to prepare and should phase in the change.

The Korean experience showed the necessity of finding the right balance between reducing tax compliance costs and expanding the tax base. The government started out in 1997 with optional ETI before making it compulsory starting in 2011. Throughout the process, the government emphasized that the aim of compulsory ETI was to "alleviate taxpayers' tax compliance costs" and to "enhance the transparency of business transactions." To achieve these goals, the Ministry of Strategy and Finance and the NTS took measures to facilitate ETI and to alleviate taxpayers' compliance costs for both ETIs and taxes overall. At the same time, the NTS worked to augment its ability to combat tax frauds by using real-time access to tax information provided by ETIs.

The NTS established *e-sero*, an Internet-based ETI-issuing portal allowing taxpayers to issue ETIs and retrieve information on the ETIs they issue without any service charge, significantly alleviating the burden of storing invoices and making filing tax returns easier. Those without Internet access can use telephone ARS, similar to telephone banking, to issue ETIs. ETIs can also be issued through electronic terminals used for credit cards, debit cards, and cash receipts. Large-scale businesses that already have their own information systems, such as ERP, can use them to issue ETIs after acquiring the standard certification and registering their system with the NTS. Small- and medium-sized companies that issue a large volume of ETIs can outsource ETI issuing to application service providers as well.

TABLE 15 | Penalty Rate for Noncompliance with ETI Information Transmission

| | Application period | Delayed transmission of ETI information: Transmission after the next day of ETI issuance until the 11th of the next month of VAT taxing period | No transmission until the 11th of the next month of VAT taxing period |
|-----------------------|---------------------------|---|--|
| Corporate businesses | From 2011 to 2013 | 0.1 | 0.3 |
| | From 2014 | 0.5 | 1.0 |
| Individual businesses | From 2012 to 2014 | 0.1 | 0.3 |
| | From 2015 | 0.5 | 1.0 |

Korea enforces compulsory ETI by levying penalties for e-invoices delayed or not transmitted to the NTS. The penalties were also phased in gradually, ratcheting up from lowered rates to standard ones. Table 15 shows the gradual phase-in structure for penalties.

Standardization of e-Invoice

Standardizing e-invoices ensures the compatibility of those produced by different IT users on different IT systems. This is critical to expeditious adoption of e-invoicing. In Korea, more than 200 different e-invoice formats existed before standardization, meaning taxpayers potentially needed 200 different document viewers to accept and read ETIs.

Successful standardization requires public and private participation. Private stakeholders, such as e-invoice service providers and e-invoice users with their own legacy systems, must agree on common e-invoice standards to minimize adjustment costs. Public sector institutions should also work to coordinate and expedite standardization because private sector stakeholders may have conflicting interests in reaching an agreement. In Korea, while the ETI standards were established through agreement among private sector stakeholders, certification of ETIs by the KIEC, a public institution, faced opposition from e-invoice service providers. In the end, the issue was settled among private sector stakeholders. Korea’s experience suggests that ETI standardization and certification did not materially affect ETI adoption as expected. Nevertheless, ETI standardization and certification were unquestionably integral to compulsory ETI and contributed to its swift introduction. If standardization and certification of ETIs had not been cleared before compulsory ETI was introduced, it would most likely have taken much longer to institute the compulsory ETI and attain standards acceptable to stakeholders. Countries working to adopt compulsory ETI would do well to first roll out standardized ETIs.

Incentives for e-Invoice

Since compulsory e-invoice entails additional burdens and costs to taxpayers—especially investment expenditure for IT systems or current short-term expenditure to outsource e-invoicing—should

e-invoice issuers be compensated for these newly incurred costs? Compulsory ETI was criticized for placing tax authorities' administrative convenience above the taxpayers' preference and rights (Kim and Suh 2012). To alleviate such criticism and mollify taxpayers, financial and nonfinancial compensation for the burden and costs associated with e-invoicing may be considered, at least during the initial stage of the introduction. Once incentives are made available, however, it becomes difficult to roll them back. Policy makers must carefully weigh the costs and benefits of incentives before granting them.

Korea offered both financial and nonfinancial incentives for complying with compulsory ETI. Taxpayers who issued ETIs and transmitted ETI information to the NTS were exempted from the duty to submit the aggregate summary lists of invoices containing transaction information and maintain invoice records for five years. Such incentives were expected to lessen VAT compliance costs significantly. In addition, a direct tax incentive—a KRW 100 (approximately US\$0.1) tax credit for each ETI issued, with an annual ceiling of KRW 1 million—was also given to subsidize the cost of the Internet or telephone use for e-invoicing. Because incentives were limited, they most likely mattered only to small and micro businesses. Korea's experience demonstrates, however, that once tax credits are introduced, they tend to grow and persist for an extended period. Korea's incentives were meant to last only a year after compulsory ETI was instituted, but they were extended for an additional year. Similarly, the amount of tax credits grew from KRW 100 to KRW 200, the average cost for issuing an ETI when outsourced to an ETI service provider. The tax credit was scrapped in 2013 for corporate businesses but extended until 2015 for individual businesses when ETIs became compulsory for them in 2012.

Assessing Korea's Success with ETI

Pace of ETI Adoption

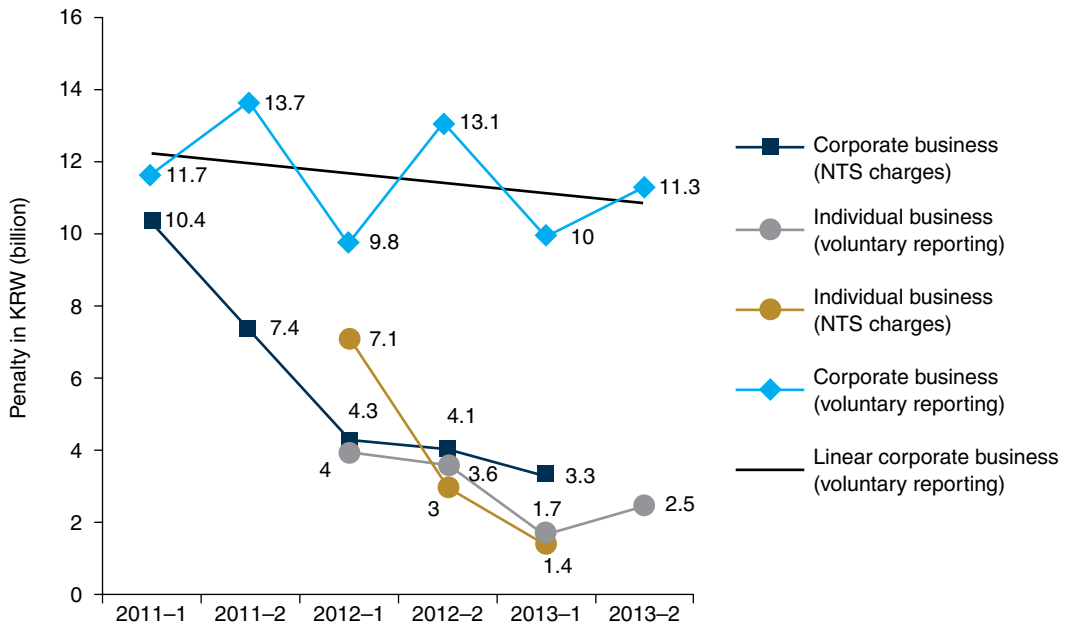
After the introduction of compulsory ETI in 2011, ETI use reached nearly 100 percent, as shown in Table 16, a remarkable growth from around 15 percent before compulsory ETI. As a result, penalties for transmitting ETI information late or not at all continued to decline, as shown in Figure 19. Penalties assessed on corporate businesses' voluntary reporting fluctuated, but gradually declined as well. Other penalties pertaining to NTS charges and individuals' voluntary reporting also headed lower.

TABLE 16 | Pace of ETI Adoption

| Year | Number of companies | | | Transaction value (KRW, trillions) | | |
|------|------------------------|-----------------------|---------|------------------------------------|-------------------------------|---------|
| | Compulsory issuers (A) | ETI participation (B) | B/A (%) | Total value of transactions (C) | Value of ETI transactions (D) | D/C (%) |
| 2013 | 473,794 | 470,359 | 99.3 | 2,456 | 2,454 | 99.9 |
| 2012 | 448,996 | 445,252 | 99.2 | 2,421 | 2,416 | 99.8 |
| 2011 | 424,545 | 420,023 | 98.9 | 2,345 | 2,341 | 99.8 |

Source: The National Tax Service, Korea.

FIGURE 19 | Penalties for No Transmission or Late ETI Transmission to the NTS



Source: The National Tax Service, Korea.

Reduced Tax Compliance Cost

The Korea Institute of Public Finance and the NTS estimated the reduction in private businesses’ tax compliance costs in 2011a due to ETIs (KIPF 2011a) using the OECD’s Standard Cost Model. According to their estimate, the reduction came to KRW 781 billion (approximately US\$710 million) for corporate businesses and KRW 198 billion (approximately US\$180 million) for individual businesses, for a total of KRW 978 billion, as shown in Table 17. Notably, reductions totaling KRW 725 billion (US\$660 million), or 74 percent of the total, occurred from issuing and receiving invoices.

TABLE 17 | Reduction in Tax Compliance Cost in Invoicing (KRW, billions)

| | | Issue | Receive | Store | Summary of invoice reporting | Acquisition, mailing, transportation, and others | Total |
|-----------------------|--------------------------|-----------------|-----------------|----------------|------------------------------|--|------------------|
| Corporate businesses | Cost reduction (percent) | 295.1 (37.8) | 301.9 (38.7) | 56.7 (7.3) | 70.2 (9.0) | 56.5 (7.2) | 780.5 (100.0) |
| Individual businesses | Cost reduction (percent) | 16.7 (8.5) | 111.3 (56.3) | 35.7 (18.1) | 23.5 (11.9) | 10.4 (5.3) | 197.7 (100.0) |
| Total | | 311.9 | 413.2 | 92.4 | 93.8 | 66.9 | 978.2 |

Source: KIPF 2011a.

Initial transition costs for ETI were estimated KRW 263 billion (approximately US\$240 million). Transition cost for corporate businesses came to KRW 222 billion, of which KRW 158 billion accounted for acquisition cost for new IT systems. On the other hand, transition cost for individual businesses was KRW 41 billion. In addition, according to the NTS, costs incurred by the NTS for developing ETI systems, including the EWS and system operation, were approximately KRW 27 billion from 2009 to 2014.

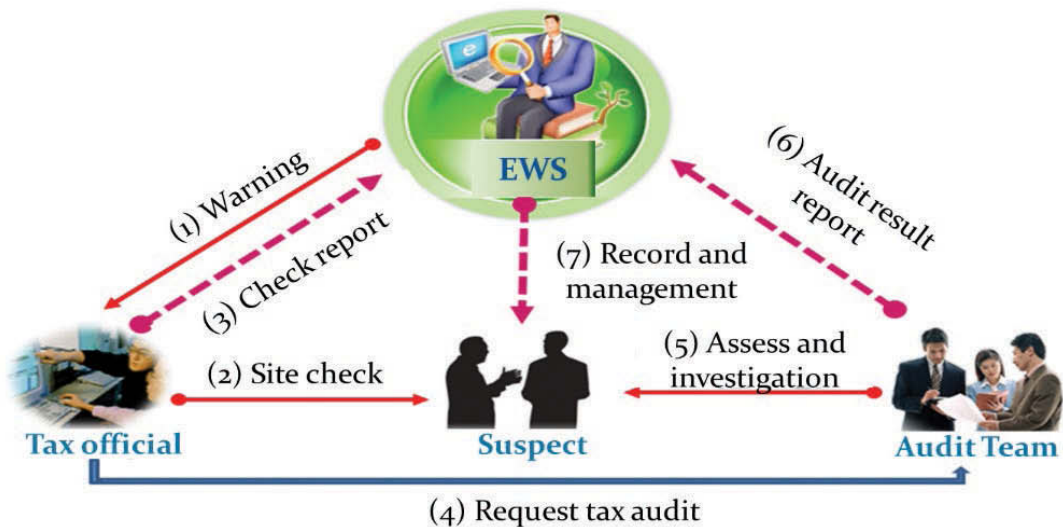
These findings suggest that the benefits of ETIs (KRW 978 billion) easily exceed initial private sector (KRW 263 billion) and public sector investment costs (KRW 27 billion). Taking into account tax revenue increases from curbing tax evasion and fraud and cost savings to the NTS from improved invoice administration, the benefits would be significantly higher.

Combating Tax Evasion and Fraud

The NTS launched its internally developed ETI early-warning system in January 2012 to combat invoice seller fraud and identify input tax credit frauds.⁴⁹ EWS profiles suspicious transactions using information from ETIs, corporate income tax filings, tax delinquency records, and other sources. EWS not only issues early warnings for tax frauds, it also conducts risk assessment and verifies VAT refund claims.

One key function of the EWS is to monitor ETI issuing in real time and sound an alarm when invoice seller fraud is identified, even before VAT is filed. As shown in Figure 20, the EWS workflow is straightforward. First, EWS monitors taxpayers' transactions and ETI issuing in real time and issues a warning to the regional tax officer in cases when: (i) a business issues a large number of invoices for substantial

FIGURE 20 | Workflow of ETI Early-Warning System



Source: Korea, NTS 2012b.

49. The NTS developed EWS as one component of its ETI systems. Development costs for EWS were about KRW 700 million (US\$630,000) over three years, from 2009 to 2011.

amounts and closes within a year of starting; (ii) an imbalance is identified between purchases and sales with a small percentage of ETI issuing; (iii) a business issues a large number of invoices with substantial amounts in a short period of time without filing tax returns; and (iv) sales far exceed purchases and a tax delinquency exists (Korea, NTS 2012a). The regional tax officer follows up by checking the suspicious activity during an on-site visit and reports the result to the EWS. When deemed necessary, the regional tax officer requests a tax audit, which tax auditors then perform. They may then reassess the business's tax liability or refer the matter to the government prosecution authority, report their findings, and register the noncompliant taxpayer in the record system.

Another major function of the EWS is to electronically verify VAT return information early on, following VAT filings, by cross-checking taxpayers' sales and purchases and screening suspicious input tax credit claims or other signs of fraud. Before ETIs were introduced, it took as long as 18 months (or even up to 30 months after transactions) to detect data discrepancy between sales and purchases and assess the correct taxes. ETIs and EWS, however, shortened this process to three months and have been especially effective at detecting invoice sellers who issue substantial amounts of invoices and quickly disappear.

Since the EWS was introduced in 2012, it has triggered a total of 6,822 early warnings and early verifications for tax evasion and fraud, including pilot operations in 2011. Of these, 1,922 cases or 28.2 percent of the total, were investigated. Through the first half of 2014, 1,643 tax investigations had been completed, and 1,159 cases, or 17 percent, led to misconduct charges by the government prosecution authority. Resulting tax levies reached KRW 1,187 billion (see Table 18).

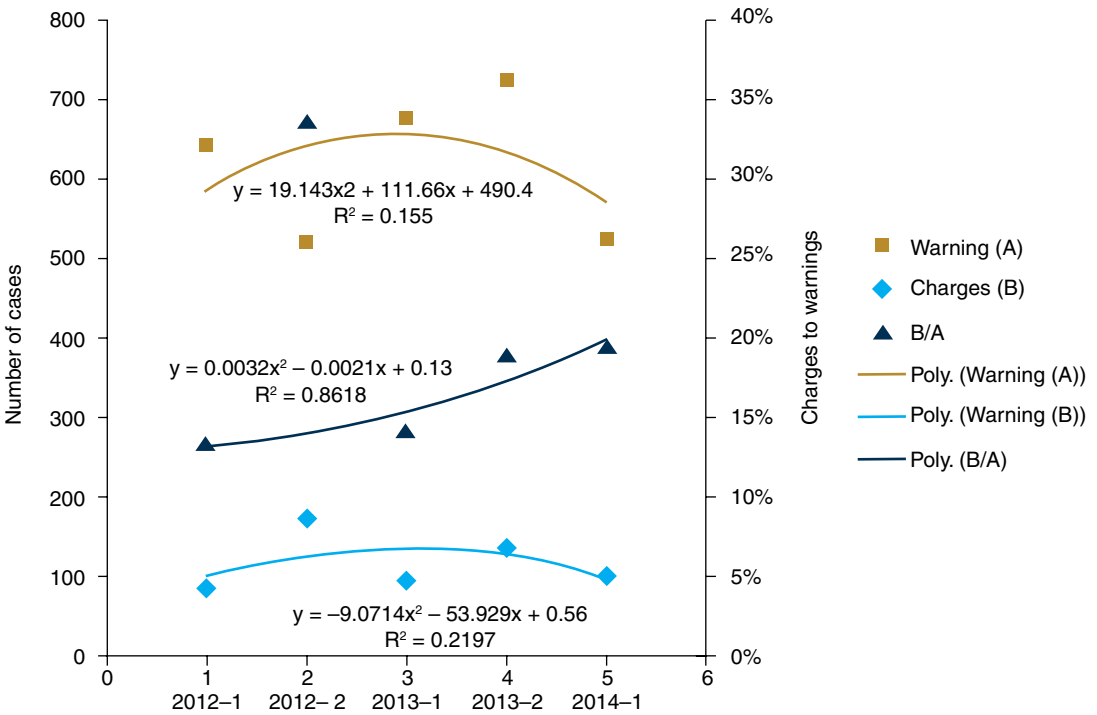
An area of particular interest is determining the extent to which ETI and EWS contributed to reduction in tax evasion and fraud. According to data provided by the NTS, the number of early warnings since 2012 has risen from 639 in the first half of 2012 to 722 in the second half of 2013, but it fell back to 521 in the first half of 2014; that is, the trend was upward during the initial stage of the ETI and EWS implementation, but shifted downward thereafter. The most likely explanation is that, following an initial increasing phase, numbers of tax evasion and fraud declined learning that the ETI and EWS could effectively identify them.

TABLE 18 | Early Warning/Verification and Investigation

| | Early warnings/ verifications triggered (A) | Tax investigations | Investigations completed | Charges of wrongdoing (B) | Taxes levied (billions) | Charges-warning ratio (B/A) |
|------------------|--|---------------------------|---------------------------------|----------------------------------|--------------------------------|------------------------------------|
| Total | 6,822 | 1,922 | 1,643 | 1,159 | 1,186.8 | 17.0% |
| First half, 2014 | 1,021 | 283 | 244 | 198 | 232.8 | 19.4% |
| 2011–2013 | 5,801 | 1,639 | 1,399 | 961 | 954.0 | 16.6% |

Source: The National Tax Service, Korea.

FIGURE 21 | Number of Early Warnings and Charges



The number of charges for misconduct demonstrates a similar trend (see Figure 21). The ratio of wrongdoing charges to warnings triggered rose from 13.3 percent in the first half of 2012 to 19.4 percent in the first half of 2014. The 33.4 percent spike during the second half of 2012 most likely resulted from the backlog of tax investigations since 2011. Controlling for outlier data, the ratio shows an upward trend, suggesting the ETI and the EWS raised the accuracy of tax fraud warnings.

Analysis of Perception Survey Data

From October to December 2014, a survey conducted with 342 respondents, yielding 332 valid responses, undertook to determine perceptions among Korean taxpayers and private tax practitioners (including tax accountants, certified public accountants, lawyers, and business taxpayers) regarding compulsory ETI.⁵⁰ The survey findings are summarized in Table 19.

The survey results showed very positive assessments from tax practitioners and taxpayers on compulsory ETI for VAT compliance, transaction transparency, and taxpayer service. Despite the ex-ante expectations, taxpayers and private tax practitioners shared similar perceptions on the ETI, with no statistical difference of perception in their responses. (The Chi-square tests on responses from tax practitioners and taxpayer to each question showed the responses were independent of whether the respondent was a taxpayer or a tax practitioner.)

50. See Appendix 3 for the demographics of the survey respondents.

TABLE 19 | Survey Results on Compulsory ETI in Korea

| Questions | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
|---|------------------------|-------------------------|----------------------------|-------------------------|----------------|
| 1. Do you think there are many VAT evasion cases in Korea, such as underreporting sales or creating fake invoices? | 8.1% | 40.1% | 29.8% | 19.0% | 3.0% |
| 2. Do you think compulsory ETI will significantly contribute to curbing VAT evasions by enhancing transaction transparency (i.e., real-time access to transaction information)? | 1.5% | 8.4% | 20.8% | 60.5% | 8.7% |
| 3. Do you think compulsory ETI has improved taxpayer service by facilitating tax filing, for instance, through automation of invoice issuance? | 1.5% | 9.6% | 16.0% | 63.6% | 9.3% |
| 4. What is your opinion about scaling up the obligation of ETI henceforth? | 5.1% | 14.8% | 20.8% | 43.1% | 16.3% |
| 5. Do you think taxpayers' burden has increased after the introduction of compulsory ETI? | 3.0% | 18.1% | 26.5% | 45.8% | 6.6% |
| 6. Do you think electronic tax administration including ETI reduces the possibility of tax evasion? | 1.2% | 10.5% | 20.5% | 58.1% | 9.6% |
| 7. Do you think businesses file more accurate VAT return after the compulsory ETI? | More accurate 75.9% | Equally accurate 19% | Equally inaccurate 4.8% | More inaccurate 0.3% | |

Regarding whether VAT tax evasion was widespread in Korea, 22 percent of the respondents agreed, and 48.2 percent did not. On the question of the effect of compulsory ETI, the majority of the respondents agreed or strongly agreed that ETI encouraged VAT compliance and enhanced transaction transparency and taxpayer service; 75.9 percent of the respondents agreed that Korea’s compulsory ETI made businesses file VAT returns more accurately; 69.2 percent agreed that compulsory ETI contributed to curbing VAT evasions; and 72.9 percent agreed that compulsory ETI improved taxpayer service by facilitating tax filing.

In contrast to the positive responses, 52.4 percent of the respondents answered that taxpayers’ burden increased after the compulsory ETI, most likely due to short-term transition costs for IT systems, employee training, and other similar costs. Negative assessments were outweighed by positive assessments on tax evasion prevention, transaction transparency, and taxpayer service, however. Greater taxpayer convenience and longer term cost savings in invoicing—electronic invoice issuing

and receiving, exemption from submitting aggregate summary lists of invoices containing transaction information, exemption from the obligation of five-year invoice storage, and other savings in transaction operations—likely affected the perception on taxpayers’ burden. In addition, positive responses from 59.4 percent of the respondents on expanding ETI compliance to more individual businesses demonstrated that people were receptive to compulsory ETI despite the initial cost.

Reducing Underreporting in Retail Businesses and Addressing the Underground Economy through Tax Incentives for Electronic Payments

The history of domestic resource mobilization (DRM) in the Republic of Korea is characterized by the tax authority’s efforts to increase revenue and enhance tax equity by broadening the tax base. Since the National Tax Service was established as an organization separate from the Ministry of Finance in 1966, with the goal of mobilizing tax revenue more effectively, the most drastic change in tax administration occurred in 1996 when taxation based on government assessments shifted to taxation based on taxpayers’ voluntary tax returns. Before voluntary income tax returns were instituted, NTS either assessed taxpayer’s income tax liabilities based on their bookkeeping and other records or it accepted taxpayer income tax returns that complied with preset standards or that reported income above preset standard income-to-sales ratios set by the business sector, geographical area, and business scale. After abandoning the government assessment system, however, NTS faced a challenge: How could it verify taxpayers’ voluntary income tax returns? The most problematic areas were business-to-consumer (B2C) retail sectors with heavy cash transactions (such as professional individual-service sectors, hotels, restaurants, bars, salons, pharmacies, and other retail stores). While business-to-business (B2B) transactions were traceable through VAT invoice audit trails, B2C transactions, especially cash sales, could not be traced by tax authorities. End-consumers did not have any incentive to obtain receipts or to report purchases to tax authorities, unlike businesses that claim input VAT credit against their output VAT. Accordingly, tax policy and tax administration authorities began exploring more fundamental approaches to creating audit trails for B2C cash transactions.

Introduction and Failure of Mandatory Cash Register Use

Since 1977 when VAT was introduced, Korea’s tax authorities made efforts to effectively capture the sales of cash-intensive industries using the invoice credit VAT system. The same year, the Ministry of Finance rolled out comprehensive legal provisions to prevent underreporting in retail sectors.⁵¹ The VAT Act made the use of cash registers (CR) mandatory for designated cash-intensive businesses, with penalties for failing to install CRs, neglecting to issue receipts, and altering cash sales.⁵² In addition to

51. Article 32, Value Added Tax Act and Articles 82 and 83 of VAT Presidential Decree, effective as of January 1, 1977.

52. The penalty was very strong: a 15-day business suspension for two detected instances of receipt nonprovision or cash sale manipulation in a 90-day period and business closure after three detected instances. The penalty for failure to install CRs was KRW 500,000.

deterrent measures, tax incentives were instituted for both retailers and consumers. Retailers using CRs received a tax credit against VAT payable (0.5 percent of CR-recorded sales), and customers who collected and submitted CR-issued receipts to the government were given cash compensation of 1 percent of the purchase value. Korea's Chamber of Commerce and Industry and many consumer NGOs allied with the NTS to run a nationwide campaign to educate and encourage retailers and consumers to issue and receive receipts.⁵³

These policy measures failed, however, despite tax authorities' continuous efforts into the early 1990s to encourage receipt exchange in retail sectors. Retailers, urged to install CRs by NTS's strong administrative recommendation, were reluctant to use them to issue receipts, and if consumers did not request receipts, retailers continued to drop cash sales to evade taxes. In response to taxpayers' presumed underreporting and tax evasion, tax authorities even denied retailers' VAT and income tax returns and assessed taxes high above the sales recorded in the CRs.⁵⁴ This contradictory move by tax authorities provoked friction with taxpayers, criticism from the public, and distrust against government policies and authorities. In addition, consumers' tendency to neglect to obtain receipts did not change substantially. Despite compensation for obtaining CR receipts, consumers did not actively do so because the application process for receipt compensation was cumbersome and inconvenient and the economic benefit was relatively small.⁵⁵ Even worse, finding the system ineffective, the Korean government abruptly abolished CR receipt compensation after only three years, thus eliminating consumers' only incentive to collect receipts.⁵⁶

In 1988, mandatory use of cash registers was *de facto* abolished, and in 1993, the VAT Act article making CR use mandatory was officially changed to support voluntary use of CRs.⁵⁷ Tax credits to business sellers for issuing CR receipts (0.5 percent of the sale) were maintained to encourage voluntary CR use. In 1996, however, even the tax credit for CR receipts was repealed as CRs had proven ineffective in reducing cash sale underreporting.⁵⁸

Tax Incentives for Electronically Traceable Payments: Early Days

After the mandatory use of CRs failed, tax authorities in Korea looked to other policy and administrative options to prevent underreporting. In the late 1980s, they began to focus on electronic payments, such as credit card payments, that enabled tax authorities to follow the retail sectors' audit trails. In

53. "Korea Chamber of Commerce Campaign for Issuing and Receiving Receipts," *Kyunghyang Shinmun*, January 18, 1977.

54. A news article in the *Kyunghyang Shinmun* (September 27, 1979) reported that cash registers became useless because businesses neglected to issue receipts and consumers were unaware of them. It also reported that fewer than 1 in 10 restaurant customers obtained receipts, and no one obtained receipts in grocery stores. According to a taxpayer who equipped his business with a very expensive cash register at the urging of tax officials, tax inspectors did not assess taxes based on the cash register records but levied a 20 percent additional tax ("Equipped with an Expensive Cash Register but Distrusted," *Dong-a Ilbo*, February 20, 1979).

55. "Urgent to Make Receipt Exchange a Practice After One Year of Campaign," *Mail Business*, February 7, 1978.

56. "Receipt Compensation Abolished from Next Year After Three-Year Trial with Less Effectiveness," *Dong-a Ilbo*, September 24, 1979.

57. Article 32, VAT Act, effective as of January 1, 1994.

58. Paragraph 2, Article 32, VAT Act, effective as of January 1, 1996.

1984, to encourage use of credit cards in retail service sectors, the Ministry of Finance introduced regulations⁵⁹ requiring large-scale businesses (above KRW 10 billion in sales) to submit detailed lists of tax-deductible business entertainment expenses to the NTS, with the exception of expenses paid using credit cards. In 1986, the NTS first requested credit card companies to submit taxpayers' credit card transaction data, which was allowed under the Credit Card Business Law when requested by tax authorities for purposes of tax inquiries or investigations. The NTS thereafter began to use credit card transaction information to verify retail businesses' tax returns (Jang 1997, 178). The effects of this approach were limited, however, since significant numbers of transactions were still paid with cash.

From the mid-1990s, when personal income taxation in Korea shifted from use of government assessments to voluntary reporting, cash transactions without receipts and underreporting became much more serious challenges to the Korean tax authorities. Against this backdrop, in 1994, the Ministry of Finance introduced a tax incentive for credit card use—0.5 percent of credit card sales credited to VAT payable for retail sellers dealing mainly in goods or services to consumers.⁶⁰ In 1996,⁶¹ the ministry increased the tax credit rate from 0.5 percent to 1 percent (the ceiling of 3 million won was put in place beginning in 1999).⁶² As of January 1, 2000, the tax credit rate increased to 2 percent, with a ceiling of 5 million won.⁶³

Tax incentives to end-consumers paying with credit cards was contentious, however. In 1995, the Ministry of Finance began reviewing tax deductions for wage earners who used credit cards to increase electronically traceable payments,⁶⁴ and in 1998 the Ministry of Finance and the Economy (MoFE) undertook a series of measures to encourage credit card use: First, it revised the Income Tax and VAT Acts so that the NTS could designate specific retail businesses primarily selling goods and services to individual consumers as credit card membership targets to be strongly encouraged to get credit card memberships.⁶⁵ In practice, such NTS recommendations, which could initiate tax audits, were seen as *de facto* mandatory.⁶⁶ Simultaneously, regulations on tax deductible business entertainment expenses were strengthened, so that any business entertainment expense exceeding KRW 50,000 (approximately US\$50) had to be paid with a credit card or VAT invoice to be tax deductible.⁶⁷ Tight deductibility rules on business entertainment expenses were believed to enhance transparency and uncover hidden sales by retail businesses.

59. Article 44-3, Corporate Income Tax Presidential Decree, effective as of October 5, 1985, and Article 106-2, Personal Income Tax Presidential Decree, effective as of October 5, 1985.

60. Paragraph 1, Article 32-2, VAT Act, effective as of January 1, 1994.

61. Paragraph 1, Article 32-2, VAT Act, effective as of January 1, 1996.

62. Paragraph 1, Article 32-2, VAT Act, effective as of January 1, 1999.

63. Paragraph 1, Article 32-2, VAT Act, effective as of January 1, 2000.

64. "Tax Deduction for Credit Card Use," *Mail Business*, May 18, 1995; "Tax Deduction for Credit Card Use to Wage Earners," *Mail Business*, July 26, 1995.

65. Article 162-2, Income Tax Act, effective as of January 1, 1999. Article 32-2, VAT Act, effective as of January 1, 1999.

66. "Mandatory Credit Card Membership for Hospital, Pharmacy, and Hotel Businesses," *HanKyoreh*, June 5, 1998; "Hospital, Private Education Institute, Restaurant, Hotel Businesses Will Be Subject to Tax Investigation, If Declining Credit Card Payments," *Kyunghyang Shinmun*, December 14, 1998.

67. Article 35, Income Tax Act, effective as of January 1, 1999. Article 25, Corporate Income Tax Act, effective as of January 1, 1999.

Rationale for TIETP: Policy Shift to Measures Encouraging End Consumers

In 1999, tax incentives for electronically traceable payments (TIETP) were introduced.⁶⁸ Korea's experience prior to introducing TIETP was that deterrent measures were ineffective and complete failures in terms of enforcement. Normative approaches, such as campaigns and education, were also not effective in Korea, a strongly government-led country where public education and awareness campaigns, intrusive government guides, and recommendations were rampant. In addition, policies targeting business sellers, including tax incentives for CR receipts, was ineffective, because tax benefits given to sellers did not exceed illegal gains obtainable from underreporting, especially in a society with low tax morale. The question therefore became whether a pulling policy encouraging end consumers to provide third-party information would be more effective in reducing underreporting. Under the invoice credit VAT system, business buyers report business sellers' sales by claiming their input VAT credit in B2B transactions. In B2C transactions, however, end consumers do not provide tax authorities with any information on business sellers' sales. Pulling policies to encourage end consumers to play active roles in providing this information could be a powerful tool for revealing hidden transactions in cash businesses. If end consumers, encouraged by tax incentives, made purchases with electronically traceable payments, tax authorities could access secure and reliable sales data on cash-intensive businesses.

According to Jang's survey (1997), conducted before TIETP's introduction, while only 8.9 percent of survey respondents obtained receipts in retail stores, approximately 90 percent⁶⁹ said they would pay with a credit card if the government introduced tax deductions for credit card payments. Another survey showed that 75.8 percent of respondents would use credit cards more frequently if tax incentives for their use were introduced.⁷⁰

TIETP Structure and Process

TIETP Incentive Structures

In 1999, the MoFE designed TIETP to encourage people to use credit cards but at the same time to limit the policy's fiscal impact. TIETP offered tax deductions only from taxable labor income. It did not allow tax deductions from business or real estate rent income since those expenses were already tax deductible under the Income Tax Act. The credit card tax deduction was limited at both ends by a minimum threshold and a maximum ceiling and included a sunset clause. Until 2002, eligible income deductions (EID) were allowed at the 10 percent (deduction rate) of electronically traceable payments (ETPs), including credit card or debit card payments exceeding 10 percent of total labor income (TLI) in a taxable year, within the ceiling set at the lesser of three million won (approximately US\$2,600) or

68. Paragraph 126-2, Restriction of Special Taxation Act, effective as of August 31, 1999.

69. Use credit card without exception (56%), transact only with credit card member stores (5%), use credit card even for the payment of small amounts (26%), less interest (10%), no interest (2%), no response (1%).

70. "More Use of Credit Cards If Tax Incentive for Credit Card Use Were Introduced: Samsung Card's Survey to 300 Customers," *Kyunghyang Shinmun*, July 19, 1999.

10 percent of TLI.⁷¹ To avoid double deductions, insurance premiums paid to public insurance funds, including National Health Insurance, National Employment Insurance, and the National Pension Fund, and for commercial indemnity insurance, as well as tuition and entrance fees paid to public and private regular educational institutions, were not included in eligible ETP.⁷² In addition, none of the following areas, for which underreporting was not an issue, were included: national and local taxes; utility payments, including electricity, water, telephone, television, and heating and cooking fuel gas; and transactions abroad.⁷³ However, medical expenses, tax deductible if spent over the deduction threshold under the Income Tax Act, were included as eligible ETP to reduce underreporting in medical service sectors.

TIETP has been revised several times since it was introduced. Its sunset clause has been extended every successive sunset year, leaving TIETP still in effect. TIETP expanded until 2004, but the scale of incentives has decreased since 2005. Incentives for debit card or ETCR use have increased since 2003, after overconsumption and credit card debt defaults became social problems. Table 20 summarizes the changes to TIETP made since 1999.

TIETP Process

Wage earners eligible for tax deductions for credit card payments may submit to NTS, via their employers, the credit card tax deduction application form and a credit card transaction report issued by their credit card companies. These materials must accompany the wage earners' labor income tax settlements filed at the end of the tax year. Credit card companies must issue credit card transaction reports to their customers upon request, or they may voluntarily issue the reports to their customers even without the request.⁷⁴ After TIETP was introduced, credit card companies began voluntarily sending their customers annual transaction reports at the end of the tax year as a customer service. In 2000, when TIETP was fully implemented, the Act on the Submission and Management of Taxation Data (ASMTD) became law. According to the Act, credit card companies must regularly submit member stores' credit card or debit card transaction data to NTS. As of 2012, wage earners can claim TIETP tax deductions by confirming prefilled credit card transactions data forms provided by NTS through its HomeTax Service. If the credit card tax deduction application is valid, employers, acting as the withholding tax agents for wage earners' income, subtract the taxes saved by TIETP together with other tax deductions and credits from the tax due in the month following the year-end tax settlement.⁷⁵

The TIETP process differs completely from the CR receipt compensation process adopted in 1977. People who wanted to receive receipt compensation had to complete a cumbersome application process, collecting their receipts and taking them to a regional NTS office or commercial bank commissioned

71. Article 126-2, Restriction of Special Taxation Act, effective as of August 31, 1999.

72. Article 121-2, Presidential Decree of Restriction of Special Taxation Act, effective as of October 30, 1999.

73. Ibid.

74. Article 121-2, Presidential Decree of Restriction of Special Taxation Act, effective as of Oct 30, 1999.

75. Article 201, Presidential Decree of Income Tax Act; Article 93, Order of Ministry of Strategy and Finance for Income Tax Act.

TABLE 20 | Changes to TIETP

| Year | Eligible electronically traceable payments (ETP) | Deduction rate | Threshold for TIETP | Deduction ceiling |
|------|--|---------------------------------|--------------------------|-------------------------------------|
| 1999 | Credit cards Debit cards | 10% | $10\% \times \text{TLI}$ | <i>Min (10% × TLI, W 3 million)</i> |
| 2001 | Same as above | 20% | Same as above | <i>Min (20% × TLI, W 5 million)</i> |
| 2003 | Credit cards Debit cards | 20% 30% | Same as above | Same as above |
| 2004 | Credit cards Debit cards Bearer-identifiable prepaid cards (BIPC) | 20% | Same as above | Same as above |
| 2005 | Electronically traceable cash receipts (ETCR) added | Same as above | $15\% \times \text{TLI}$ | Same as above |
| 2006 | Same as above | 15% | Same as above | Same as above |
| 2008 | Same as above | 20% | $20\% \times \text{TLI}$ | Same as above |
| 2010 | Credit cards Debit cards, BIPC ETCR | 20% 25% 20% | $25\% \times \text{TLI}$ | <i>Min (20% × TLI, W 3 million)</i> |
| 2012 | Credit cards Debit cards, BIPC ETCR Traditional market use | 20% 30% 20% 30% | Same as above | Same as above |
| 2013 | Credit cards Debit cards, BIPC ETCR Traditional market use Public transportation use | 15% 30% 30% 30% 30% | Same as above | Same as above |

Source: Authors' compilation, excerpted from the National Law Information Center (Ministry of Government Legislation).

to deal with receipt compensation. Since compensation was budgeted, consumers often could not get the full amount because budget allocations were delayed or inadequate. The TIETP application and refund process, in contrast, is easy and simple. The tax deduction is credited to wage earners' income taxes along with other tax deductions and credits, and refunds due from eligible applications are not delayed or declined. In addition, applicants need not collect the credit card receipts; credit companies issue aggregate annual transaction reports, and taxpayers receive prefilled credit card transaction forms from the NTS HomeTax Service.

Expansion of Electronically Traceable Payments: Electronically Traceable Cash Receipts

After tax incentives for credit card use were introduced in 1999, Korea introduced electronically traceable cash receipts (ETCRs) and made them an eligible form of electronic payment for TIETP in 2005. ETCR makes even cash payments electronically traceable by NTS. People who for any reason prefer to pay in cash rather than using a credit/debit card can ask retailers to issue ETCRs. The consumer provides a Resident Registration Number (Korean citizens' ID number), a registered mobile phone number, or a credit or debit card number for personal identification; the retailer then issues the ETCR through its credit card payment terminal. ETCR transaction data are automatically transferred to NTS. End consumers do not need to collect ETCRs for their income tax deduction; NTS provides ETCR transaction data to wage earners, together with credit card and debit card transaction information, through the Home Tax Service portal. Wage earners just confirm their prefilled ETCR, credit card, and debit card transaction data and submit the TIETP application to their employers as described above.

TIETP Performance Evaluation

Increase in Electronically Traceable Payments

Figure 22 shows the volume of electronically traceable payment (ETP) as a percentage of GDP from 1991 to 2014. Credit card transactions increased very sharply immediately after TIETP's introduction in 1999. They were only 4.9 percent in 1999, but skyrocketed to 34.3 percent by 2002. In absolute terms, ETP soared from KRW 28.5 trillion (approximately US\$26 billion) to KRW 261.7 trillion (approximately US\$238 billion) during the same period.

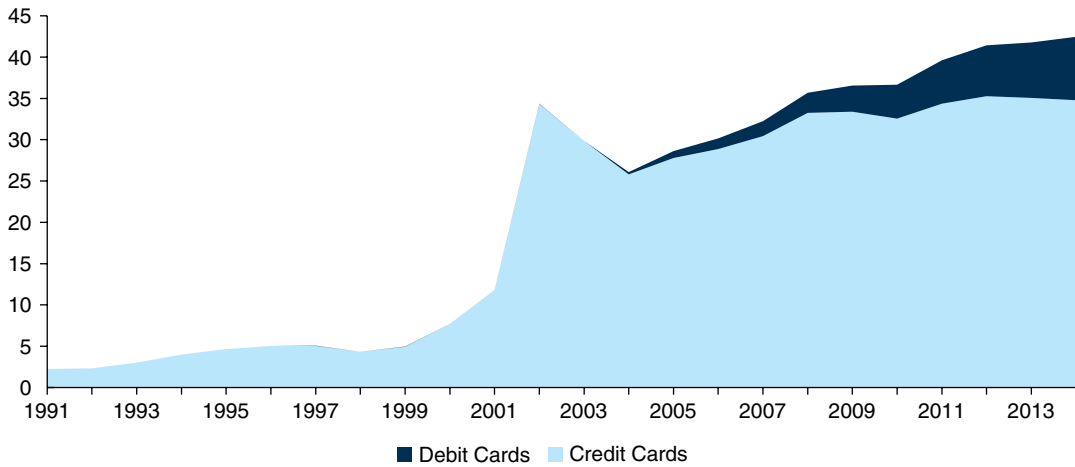
Since 2003, when the debit card TIETP deduction rate increased from 20 percent to 30 percent to favor them over credit cards, debit card payments started to rise sharply. In 2005, the ETCR was made eligible for TIETP. With these two changes, credit card payments shifted significantly to these alternatives, moderating the increase of credit card transactions since 2003, as shown in Figure 22.

In 2014, the total value of credit, debit, check, and prepaid cards, not including ETCR, reached KRW 631.6 trillion (approximately US\$574 billion), 42.5 percent of GDP. Since 2005, card payments as a ratio to GDP in Korea rank highest among the 23 member countries of the Committee of Payments and Market Infrastructures of the Bank for International Settlements.⁷⁶ If ETCR payments (KRW 91.9 trillion⁷⁷ in 2014) are included, ETP as a ratio of GDP is around 49 percent for 2014.

76. Card payments (not including e-money) as a ratio to GDP was 30.5 percent in 2005, 36.7 percent in 2010, and 42.5 percent in 2014. Data retrieved from statistics on payment, clearing, and settlement systems in the CPMI countries (each year; see table 9e for comparative tables).

77. ETCR payments were KRW 18.6 trillion in 2005, KRW 76.0 trillion in 2010, and KRW 91.0 trillion in 2014. Data retrieved from *Statistical Yearbook of National Tax* (NTS 2006–2015).

FIGURE 22 | Credit and Debit Card Transactions as Percentage of GDP



Source: Authors' aggregation of data from Bank of Korea (<http://ecos.bok.or.kr>).

Note: a. Debit card payments include check cards. b. Electronically traceable cash receipt payments are not included. c. Payments by all consumers, including not only wage and salary income earners but also self-employed businesses.

TABLE 21 | Electronically Traceable Payments as Percentage of Private Final Consumption Expenditure

| Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | |
|---|--------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Private final consumption expenditure (①) | 480.2 | 509.9 | 546.4 | 579.1 | 594.9 | 636.7 | 679.1 | 707.6 | 727.8 | 748.2 | 771.2 | |
| ETP | Credit card (②) | 190.5 | 214.8 | 241.1 | 279.3 | 303.9 | 350.7 | 398.5 | 451.3 | 441.7 | 453.9 | 503.6 |
| | Check card (③) | 7.8 | 12.7 | 18.8 | 27.9 | 36.7 | 51.5 | 66.9 | 82.8 | 92.7 | 112.7 | 131.5 |
| | Cash receipt (④) | 18.6 | 30.6 | 50.2 | 61.5 | 68.7 | 76.0 | 80.9 | 82.4 | 85.5 | 91.7 | 96.6 |
| | National taxes, etc. (⑤) | .. | .. | .. | .. | .. | .. | 8.1 | 19.2 | 18.9 | 22.6 | 46.3 |
| | Sum (⑥ = ② + ③ + ④ - ⑤) | 216.9 | 258.1 | 310.1 | 368.7 | 409.3 | 478.2 | 538.2 | 597.3 | 601.0 | 635.7 | 685.4 |
| Ratio (⑥ / ①) | 45.2% | 50.6% | 56.8% | 63.7% | 68.8% | 75.1% | 79.3% | 84.4% | 82.5% | 85.0% | 88.9% | |

Source: The Ministry of Strategy and Finance.

Notes: .. = negligible.

a. MoSF, Korea, put together data from private final consumption expenditure (National Accounts, Bank of Korea), credit card and check card payments (the Credit Finance Association), debit card payments (Bank of Korea), and cash receipts (National Tax Service).

b. Business card payments were subtracted from credit card and check card payments.

c. National taxes and four other national insurance premiums paid by credit cards were subtracted from ETP.

Table 21 shows the ETP increase as compared to private final consumption expenditure. The proportion of ETP over private final consumption expenditure increased from 45.2 percent in 2005 to 88.9 percent in 2015. The absolute majority of private consumption, other than indispensable cash transactions, are now paid with ETPs in Korea, which brings the country near to having a cashless society.

Increased Tax Net for Business Income

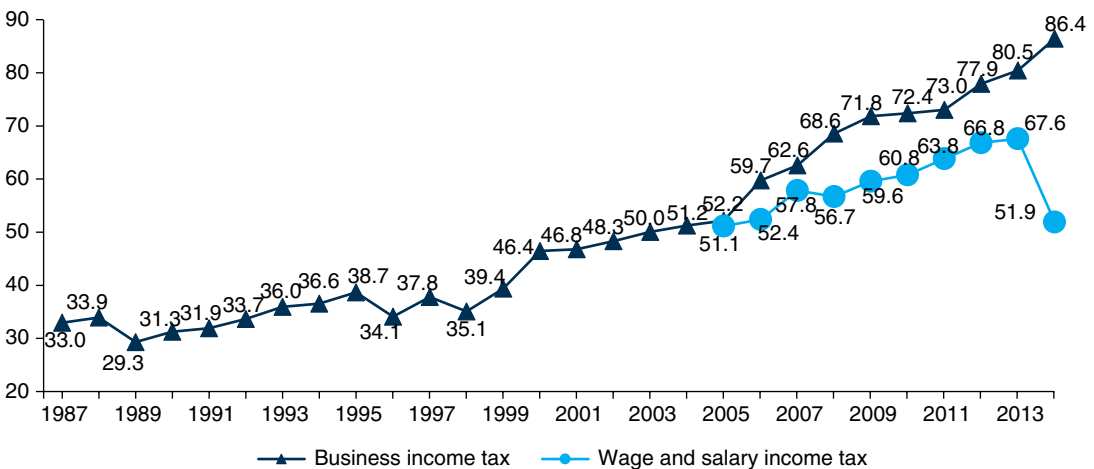
In many countries, business income earned through self-employment is more frequently underreported than wage and salary income, due to the lack of third-party information accessible to tax authorities (Pissarides and Weber 1989; Lyssiotou, Pashardes, and Stengos 2004; Gërkhani 2004; Wangen 2005; Martinez-Lopez 2012). Korea was no exception. According to Sung (1999, 69), between 1994 and 1998, before the introduction of TIETP, only about half of business income earned by the self-employed was reported to the NTS. Such low tax compliance among owner-operated businesses often led to a low number of active taxpayers as a percentage of relevant income earners.

As shown in Figure 23, the ratio of taxpayer to business income earners in Korea lingered around 30 percent from the early 1980s to the mid-1990s, but it began to increase gradually and substantially from the late 1990s onward. It rose to about 50 percent in the early 2000s and dramatically to 86.4 percent in 2014. Such an increasing trend in the business income taxpayer ratio may be largely due to the introduction of TIETP, but it is also attributable to increasing nominal income due to economic growth and, in some part, to inflation (the inflation rate is low in Korea and thus has a moderate effect). Since Korea does not adopt inflation-adjusted PIT brackets, income increases may result in a higher active taxpayer ratio. Given the economic growth and inflation effects at all times, however, TIETP seems to have changed the trend from stagnant at around 30 percent to around 80 percent since its inception.

Effective PIT Rate of Owner-Operated Businesses

The effective PIT rates are estimated using microsimulation analysis developed by Sung (2008) of Household Income and Expenditure Survey (HIES) data, a dataset from Statistics Korea. Detailed PIT estimation methods using the HIES and summary statistics of HIES appear in Appendix 4.

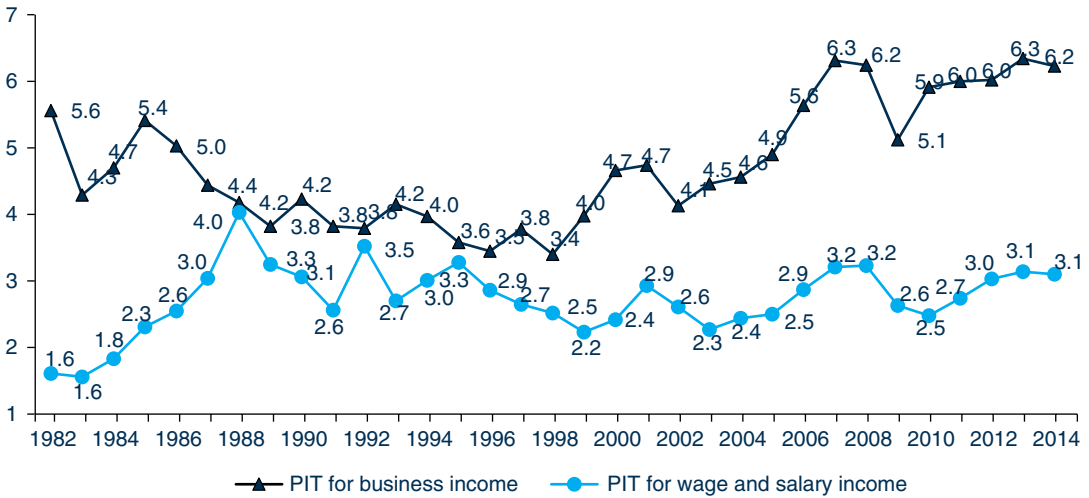
FIGURE 23 | Personal Income Taxpayers as Percentage of Relevant Income Earners (%)



Source: Authors' calculation based on *Statistical Yearbook of National Tax* (NTS 1988–2015).

Note: The wage and salary income taxpayer ratio precipitated in 2014 due to changes in the PIT income deduction system in 2014. The income deduction for education expenses, medical expenses, private insurance premiums, and charity contributions were shifted to tax credits, which made many marginal taxpayers tax exempt.

FIGURE 24 | Effective PIT Rate for Business Income and Wage and Salary Income (%)



Source: Author’s estimation using Household Income and Expenditure Survey (Statistics Korea, 1982–2014).

Figure 24 illustrates the longitudinal changes of effective PIT rates, both for self-employed business income and wage and salary income for the last three decades. The two effective PIT rates have different trends. The effective PIT rate of wage and salary income increased from 1.6 percent to 4.0 percent from 1982 to 1988 and then oscillated within the range of 2.2 percent to 3.5 percent from 1989 until recently. For business income, the effective PIT rate decreased from 5.6 percent to 3.4 percent from 1982 to 1998 but shifted to a continuous upward trend of 3.4 percent in 1998 to 6.3 percent in 2013 after the introduction of TIETP, except for the two dips caused by economic downturn in 2002–2003 and 2008–2009.

These two trends since 1999 show that TIETP contributed to broadening the tax base for self-employed businesses while it alleviated wage and salary earners’ tax burdens. Since the introduction of TIETP in 1999, wage and salary earners have actively used credit cards to get the tax incentives and, as a result, self-employed business income earners have reported their business income more honestly, mindful that third parties were reporting transactions to the tax authorities. It should be noted, however, that the upward trend in the effective PIT rate of business income may also be strengthened by an income tax creeping effect caused by nominal income increases due to economic growth and inflation, fixed income tax brackets, and PIT exemption thresholds, as in the case of the active taxpayer ratio described in the previous section. Such creeping effects might not have been realized automatically without TIETP, however, because business income tends to be underreported to offset such effects.

Quantitative Analysis for TIETP

The quantitative analysis for TIETP shows that the total gross effect of TIETP was KRW 3.4 trillion, while the cost of TIETP reached KRW 1.9 trillion. The net gain was estimated at KRW 1.4 trillion (approximately US\$1.3 billion), which increased PIT revenue by 4.2 percent as compared to a baseline scenario without the intervention of TIETP. It also shows that TIETP had a positive impact on income

redistribution due to the broadened tax base, despite the greater tax relief given to higher income earners. Detailed information on methodology, data used, and outcomes can be found in Appendix 5.

Key Findings and Conclusions of the Korea Case Study

The Korean tax administration authority has a long history of embracing ICT to enable e-tax administration and compliance. This was realized through an integrated tax management solution, supported by the necessary legal and institutional frameworks, allowing NTS to provide electronic self-service through HTS, its external portal solution. NTS had the institutional capacity (in the form of experienced business analysts and ICT project managers and a capable internal ICT service provider) necessary to succeed with such a broad ICT development agenda. In addition, the compulsory ETI that the Korean government adopted in 2011 was primarily aimed at reducing tax compliance costs and raising the transparency of business transactions. The goal was not only to adopt and integrate ICT advances into tax administration and broaden the tax base, it was also to better serve taxpayers and reduce their tax compliance costs. Embracing disruptive technologies that emerged over the lifespan of these projects (emerging e-services and portal technology, lower data transmission and storage costs, ubiquitous broadband Internet access, strong security models for e-services, and better tools for managing and leveraging “big data”) was key to the tax authorities’ success.

TIETP also effectively reduces underreporting in cash-intensive retail businesses by incentivizing end consumers to use electronic payments. TIETP was successful in turning Korea’s predominantly cash economy into one based on cashless transactions, considerably reducing the shadow economy, in a relatively short period of time. The review of Korea’s experiences here gives credence to the contention that a well-planned and well-executed e-tax policy, such as compulsory ETI or TIETP supported by a competent tax authority and stakeholders, including taxpayers, can materially broaden the tax base and simultaneously enhance tax service and tax compliance.

The analyses and findings of this case study point to some insights and considerations that may be useful to tax authorities contemplating similar e-tax administration and/or policies. First, close collaboration among the tax authorities, the IT governance body on electronic data interchange, and private IT solution providers is essential. Korea’s development of ITS and HTS could be accelerated because tax authorities collaborated with the IT department and the e-government initiative. ETIs come with both tax components and substantial IT standards and protocols. If the tax authorities, IT governing bodies, and private stakeholders are not prepared and fail to cooperate and coordinate with each other on ETIs, introducing a standardized compulsory ETI system will take more time than in the Korean experience. Standardization of ETIs adopted through agreements between the public and the private sector stakeholders before the introduction of the compulsory ETI can significantly shorten preparation time. Tax authorities and IT system providers must closely cooperate to build a user-friendly, reliable, and secure electronic system. For TIETP, additional cooperation with credit card companies and banks issuing debit card is inevitable. If they are not willing or able to provide the tax authority and individual

taxpayers ICT-based business transaction data, TIETP may not be an effective tool for preventing underreporting by vendors/retailers.

Second, any new e-tax policy to address the shadow economy, especially one that introduces measures such as compulsory ETI, must be carefully designed to minimize taxpayers' burden, including IT literacy, and tax authorities should focus on reducing compliance costs and improving taxpayer service to build trust in the tax administration. In particular, tax authorities should take due care to make available facilities and avenues for SMEs, micro businesses, and small individual businesses to easily issue and transfer ETIs to their customers for free or at a very low cost. In addition, a gradual phase-in avoids initially heavy compliance costs to small and micro businesses. Korea's compulsory ETI, for example, began with large corporations and then expanded to smaller companies in a preannounced timeframe. TIETP is basically an incentive for individual taxpayers, but retail vendors' costs for installing electronic payment terminals and credit card payment fees paid to credit card companies can be a big challenge. If retail vendors are reluctant to install credit card payment terminals and accept credit cards due to these high fees, increasing credit card payment will be difficult. The Korean government strongly drove down credit card fees,⁷⁸ which was justified by the increasing credit card sales and profits. In addition, tax credits for credit card sales by retail vendors, introduced in 1994, helped relieve the burden on small retail vendors.

Third, tax authorities' legal and technical competence to collect and analyze financial transaction information is critical to the success of e-tax measures. Korea's 2000 Act on the Submission and Management of Taxation Data played a pivotal role in enabling tax authorities to gather electronic financial transaction information and in inducing voluntary tax compliance in cash-intensive business sectors. In addition, TIS, established in 1997, enabled NTS to integrate all transaction data obtained from not only ETIs in B2B transactions, but also from ETPs, including credit cards, debit cards, cash receipts in B2C transactions, financial income information, property transaction information, and other third-party information provided by public and private institutions. NTS now makes use of TIS to verify taxpayers' tax returns and to analyze risk assessments and tax audits. Such systems play a pivotal role in detecting fraud even before tax returns are filed and provide powerful tools to be utilized to verify filed tax returns. At the same time, it improves taxpayer services by providing prefilled tax return forms and tax payment guides and services.

Fourth, the size of tax incentives should be carefully set so that the revenue forgone for that incentive does not exceed the revenue gained. In the case of TIETP, one way to do this is by setting thresholds and ceilings for incentives; another is by constraining incentives to certain eligible payments in cash-intensive business. On the other hand, ensuring that the tax rebate process is easy and guarantees assured return of the rebate are for success. The incentives given to end consumers to encourage

78. "Lowering 1–2% of Credit Card Fees," *Mail Business*, September 11, 1999; "Government, Induce Lowering Credit Card Fees," *Mail Business*, December 18, 1999; "Credit Card Fees, Maximum 10% Lowered Within This Year," *Dong-a Ilbo*, December 17, 1999.

electronic payments are relatively small, so if the application process for the tax rebate is inconvenient or cumbersome, or if rebate payments are unreliable, people will be discouraged from using the system. Korea's introduction of compulsory CR use in 1977 failed due to its inconvenience and unreliable cash compensation, while TIETP was successful because it was convenient, a characteristic ensured through electronic data processing and application processes as part of existing year-end tax settlements. Wage and salary earners can easily file year-end PIT settlement returns with prefilled ETP information provided by NTS and get TIETP tax refunds along with other tax credits due them.

Lastly, citizens' financial literacy is critical to TIETP. In low-income developing countries where many people do not have access to the financial sector or credit cards, instituting TIETP for credit/debit cards may be challenging. In this case, ETCR, which does not require credit cards or bank accounts, could provide an alternative. Consumers without credit cards or bank access pay with cash, which is made electronically traceable by using a mobile phone number or ETCR card registered to the tax authorities. In addition, tax policy makers should carefully design the tax incentive structure, keeping in mind the distortive effect of overconsumption through credit cards, which can have a negative impact on the economy. Korea experienced the negative effect of overconsumption in the early stages of TIETP. Credit card transactions in Korea skyrocketed between 1999 and 2002 after TIETP's introduction. This drastic increase in credit card transactions contributed to broadening the tax base to a great extent, but overconsumption based on credit facilitated by credit cards put the Korean economy under tremendous stress. It was believed that TIETP coupled with deregulation of the credit card business, credit companies' reckless issuance of credit cards, and lax credit controls caused widespread credit card debt defaults and led to the collapse of at least one credit card company during 2002–2003. In this sense, tax incentives for debit cards or ETCR may have fewer distortive effects on consumption and saving choices, but relatively bigger substitution effects between nontraceable and traceable payments. In response to this negative TIETP effect, the Korean government in 2003 increased the deduction rate of TIETP for debit card transactions from 20 percent to 30 percent to favor debit card usage, while maintaining the deduction rate for credit card transactions. In addition, ETCR was introduced in 2005. These measures shifted a substantial portion of credit card transactions to debit cards or ETCR transactions.



Key Challenges and Success Factors for Enabling e-Tax Administration in Developing Economies

The journey to fully implementing and harvesting the benefits of an e-tax administration, as seen in the Korea case study, is neither short nor simple. All developed economies experienced a similar 25-plus-year ICT and business capability development curve, beginning in the late 1970s. It was a necessary stage in building the tax administration ICT infrastructure, applications, and database foundation necessary to support modernizing taxpayer services and empowering tax compliance programs with business intelligence (BI) toolsets. They also all required tax policy, culture, and institutional development initiatives to bolster voluntary tax compliance. The Korean example stands out, however, for the scale of its adaptive challenges and the degree of innovation, effort, and incentive used to minimize the influence of cash in tax avoidance and evasion.

Electronic taxpayer services and intelligent compliance tools are only possible once a tax administration has an adequate data foundation of sufficient integrity. Thus, the fundamental functions of taxpayer registration; tax return and accounting transaction processing; and third-party data capture, purification, and storage are a prerequisite to implementing e-services and business intelligence for compliance. If this foundation does not have sufficient data integrity, e-services and BI tools will not fulfill their goals.

Developing countries can achieve e-tax administration much faster today than most developed countries could, given the state of the technology at the time. Today developing countries can buy a commercial off-the-shelf configuration and customization tax solution that includes all e-services (provided sufficient Internet and network services are available) and procure data analytic, mining, and reporting tools (provided data with integrity and business analyst capacity are available).

From a taxpayer engagement and education perspective, new and emerging technologies such as social media and smart phones open more channels for interaction with taxpayers and taxpayer representatives as well as more and better collaboration opportunities for tax authority agents. In addition, digitization of business activities has created richer data sources for compliance analysis, where tax agencies can gain the right to access these resources and develop analytic capability. Tax authorities can utilize smart algorithms to detect potential tax fraud by electronically cross-checking data acquired from different sources. Citizens' and businesses' pervasive use of e-services has also created acceptance and significant uptake in the use of electronic filing, payment, and notification tax services, improving the timeliness and quality of taxpayer services and freeing tax agency resources for more productive tasks.

The challenges and success factors discussed below stem from lessons learned in the execution and outcomes of ITMS implementation and e-tax enabling projects in Korea and experiences in several

TABLE 22 | Summary of Key Challenges

| | Challenge | Priority |
|---|--|----------|
| Adaptive challenges | <ol style="list-style-type: none"> 1. Maturing business community capacity and culture to maintain proper tax accounting books and records 2. Raising computer literacy and use of tax accounting software and e-filing in the business community 3. Creating incentives to use electronic rather than cash payment methods 4. Obtaining and sustaining parliamentary and government ministry engagement and sponsorship for e-governance and e-tax administration | |
| Institutional capacity and capability challenges | <ol style="list-style-type: none"> 1. Lack of business analysts to support ITMS requirements or preparation for BPR 2. Poor or little understanding of the role of the tax administration among business owners in ICT development 3. Lack of capacity to lead large, complex ITMS procurement projects 4. No capacity to attract and retain staff as ICT analysts and programmers 5. Unable to harvest the value of the data resources put in place through ITMS implementation and other e-tax initiatives in the form of improved revenues from enforcement and compliance-risk profiling tools | |
| Large ICT project management challenges | <ol style="list-style-type: none"> 1. Long lead time to ITMS implementation (three to five years) elevates project risk factors 2. Scope creep 3. Navigating between adopting tax administration good practices that come with a commercial off-the-shelf ITMS solution and doing extensive BPR on key business processes 4. Management of change issues that lead to resistance or rejection of the new ITMS 5. Long-term sustainability of the ITMS solution once the implementation contract is concluded, with capacity in several ICT service management disciplines to manage the ITMS investment | |

developing countries. They highlight key adaptive, institutional capacity and, capability, and large ICT project management challenges that must be met to successfully establish the foundations for e-tax administration. Early identification of the scale of these challenges and early development of strategies and plans to address them will greatly improve the probability of success for tax modernization efforts.

All of the challenges identified below are high priority if identified as weaknesses threatening the successful outcome of an e-tax administration initiative. The tax administration’s self-assessment against the capability and maturity model supporting e-tax administration, presented above, will reveal that administration’s priority areas. Table 22 lists the challenges identified in this paper as an overview and aid in setting priorities.

Adaptive Challenges

Successful transition to an e-tax administration requires evaluation of the country’s current culture and readiness to meet adaptive challenges, as outlined in the steps below. Some areas may require minimal attention and shorter term action and change management plans, whereas others may require

significant strategic planning efforts, policy and legislative change, communications plans, and broad engagement over several years.

1. Maturing business community capacity and culture to maintain proper tax accounting books and records

Developing countries face significant obstacles to achieve the benefits of an ITMS and e-tax administration if the business community's tax accounting practices are weak. ITMS analytic and mining tools to support compliance can only work effectively when fed enough data of sufficient integrity to help profile the noncompliant for tax administration scrutiny. Failure of the business community to maintain and file proper books and records severely limits the potential of ICT compliance tools. Where tax accounting practices are immature, proactive taxpayer education and compliance programs and collaboration with the accounting services community are needed to improve record keeping.

In the Korean case study, these issues were largely addressed before the e-payment initiative, which focused on bringing the shadow economy into the realm of proper books and records. Korea had a mature tax accounting culture in place for compliant taxpayers.

2. Raising computer literacy and the use of tax accounting software and e-filing in the business community

Computer literacy and use of accounting software and electronic records by the business community in developing countries can present a significant challenge. While ICT is in use almost everywhere today in the form of Internet connectivity and citizens and business use, not all businesses use software to record all B2B or B2C transactions electronically in ways accessible to the tax administration. This presents the business environment ICT maturity challenge of getting the necessary critical mass of taxpayers to a sufficient level of electronic books and records. Data capture from paper tax filings and records is the traditional alternative, but it does not cover the scope that data e-filing can; it is also expensive, can introduce data integrity problems through keying errors, and tends to take much longer to complete, resulting in out-of-date information that is much less useful for compliance and enforcement. And, as discussed above, technological readiness also relates strongly to the scope of the shadow economy.

In the case of Korea, its citizens, businesses, and the tax agency were early adopters of ICT, and so its technology readiness was already mature when the e-payment initiative launched. This was in part encouraged by the early development of the ITMS (TIS) and the e-government initiative aimed at increasing both public and private sector ICT capabilities.

3. Creating incentives to use electronic rather than cash payment methods

Creating incentives to change a culture with strong traditions of cash use and the resulting lack of an audit trail for financial transactions can be challenging. In effect, the tax administration must find a pull incentive for individuals and business to use electronic payment methods that leave a financial record, in addition to the push incentive of legislative requirements.

The Korean case study provides some excellent insights into the challenges and opportunities presented by this challenge (such as financial incentives for individuals and reduced red tape for businesses no longer required to submit paper invoices with VAT returns). As evidenced in the Korea study, this represents a significant change in business and citizen culture that requires sustained political, policy, and legislative strategies and intervention over a long period.

4. Obtaining and sustaining parliamentary and government ministry engagement and sponsorship for e-governance and e-tax administration

Full compliance benefits of e-tax administration demand not only an ITMS foundation and competent tax administration, but also broader e-governance legislative and policy frameworks to encourage or mandate data gathering from the private sector through e-payments, e-filing, e-registration, and other e-services. Successful e-tax administrations have worked closely with the Ministry of Finance and elected officials to build consensus on the value of implementing the necessary policy and legislative changes for e-tax over the cost, constraints, and inconvenience it places on individuals and businesses. While the tax administration and Ministry of Finance can build the business case for change, elected officials must sponsor the broader country e-governance change agenda that will create acceptance of e-tax administrations among businesses, tax practitioners, and citizen communities.

In our Korean case study, successful e-payment processing was only made possible through the sustained support the tax administration received throughout the 10 to 15 years prior to implementation, as the legal framework was put in place through several legislative changes, beginning with the tax lottery and ending with tax incentives for use of e-payment methods. These changes were tied to the broader Korean e-governance agenda across all departments, in which the tax agency and the Ministry of Finance were proactive participants.

Institutional Capacity and Capability Challenges

Recurring challenges to tax administration modernization initiatives in developing countries involve the need for tax agency staff with the skills to successfully implement large, complex change initiatives. This points to some common institutional challenges to be addressed early in the planning of tax modernization initiatives. Generally, these challenges require civil service framework changes, including job classification and salaries, knowledge and skills development within tax headquarters staff overseeing operations, and recruitment of new types of skills into the tax agency.

1. Lack of business analysts to support ITMS requirements or preparation for BPR

Tax administrations in developing countries focus largely on sustaining operations and have little experience with ICT solution development. As such, headquarters' functional staff are limited in number and usually possess little or no training or experience as business analysts capable of defining new ICT solutions to lead or participate in business process reengineering efforts. This most frequently results in severely under-resourced ITMS initiatives, with business analysts often directed to perform both the

business analyst role and their ongoing operational roles. If the job of gathering requirements for the new ITMS solution is not done well, however, the risk is high that the ITMS will not fulfill all of the business functions expected of it. If the required functions and end users are poorly understood, the tax administrations will not adopt good or best practices.

This challenge can be partially addressed by using external contract business analysts to complete the functional specifications for ITMS procurement. When doing so, it is important that the functional staff remain closely engaged with the project throughout as they still must understand, approve, and eventually train staff in the new or revised processes. Generally, external analysts are brought in only to devise the requirements; they do not participate in bid evaluation, construction, testing, end-user training, or implementation trouble shooting. Thus, headquarters staff must be sufficiently engaged and develop the capacity to complete these activities.

Korea had a long history of internal ICT development and support for tax administration, including the creation in 1968 of a special team for digitizing tax administration. As such, the tax administration had significant experience developing appropriate ICT solutions. Like most tax administrations in developed economies, Korea's also had significant in-house human resource capacity to cope with a new ITMS.

2. Poor or little understanding of the role of the tax administration business owners in ICT development

The business owner functional area in planning and managing ITMS implementation helps create the necessary detailed business requirements, plan and test the ITMS solution, and train end users. In developing countries, tax administration management resources and skills largely focus on tax program operational management to carry out the core functions of assessing and collecting taxes and encouraging compliance. Project management is very different from operational management and requires a different knowledge and skillset to succeed.

Tax administrations generally have not implemented more than a few significant transformative ICT projects approaching the scale of ITMS. Some have never done so. They thus have very little capability in terms of the skills or experience needed for ICT project management. In addition, the actual role and obligations of functional program managers and staff are often unclear or not well understood. This can cause key functional staff to resist engaging in the change agenda.

As with the Human Resources (HR) capacity challenge, the Korean tax administration had a long history in ICT development and well understood the role of the business analyst. It is noteworthy that NTS had conducted BPR, sometimes with external consultants, before undertaking a major ITMS development plan. When preparing the NTIS development plan, for example, NTS conducted BPR to identify problems that could be addressed using a new ITMS solution: NTIS.⁷⁹

79. MoSF and NTS 2011, Press Release, "Project for Entire Remodeling TIS Has Turned Out to Be Feasible," August 15.

3. Lack of capacity to lead large, complex ITMS procurement projects

Leading and gathering all functional and technical specifications to ensure that the outcome of the procurement process will be a contract awarded to a reputable firm with the capacity, knowledge, and skills to meet or exceed the expectations of the tax administration is a significant challenge. Generally, developing countries lack the experience and expertise to complete this task without supplementing their capacity with experienced contract resources. These resources must not only be experienced in large ICT procurement but also in working under government and donor procurement frameworks.

Given Korea's long and significant history of ICT management and development in tax administration, this issue was not explored in the case study. As the Korean economy grew and tax information expanded, NTS had many opportunities to manage large-scale ICT-related procurements, pursuing tax workflow automation even before major ITMS projects. Legal and institutional support for public procurement was also well established in collaboration with Korea's Public Procurement Service (PPS).

4. No capacity to attract and retain staff as ICT analysts and programmers

Civil service salaries in developing countries are generally insufficient to attract and retain highly skilled technical resources. This is most apparent with ICT expertise, as few tax administrations have staff capable of leading and completing systems architecture, analysis, design, and program code specifications. Resources successfully recruited most often leave for the private sector after gaining sufficient experience.

The common result is that ICT development, maintenance, and enhancements are largely outsourced under one of several models:

- Exclusively to a single service partner firm in the private sector,
- In an ad hoc fashion to many service providers whenever a development, maintenance, or enhancement need arises, or
- Exclusively to a single state-owned enterprise or special operating agency owned entirely or in part by the government operating under a human resource management regime that gives it the flexibility in salaries or long-term staff contracting to overcome the limitations of the broader civil service HR regime.

Although civil service salaries are still lower than those of the high-level firms in Korea's private sector, the general belief that the civil service provides a more stable job can be helpful in securing skilled human resources. Many NTS employees work in ICT maintenance and development for their entire careers and play important roles in aligning ICT solutions with tax administration needs.

5. Unable to harvest the value of the data resources put in place through ITMS implementation and other e-tax initiatives in the form of improved revenues from enforcement and compliance-risk profiling tools

Implementing an ITMS solution provides many immediate benefits to the tax administration and stakeholders in the form of improved efficiencies and effectiveness of tax operations and improved compliance through data matching. The goal of improved revenues through more intelligently directed compliance and enforcement risk profiling generally takes longer to realize. It takes time to develop functional staff with the knowledge and skills needed to extract business intelligence from the huge amounts of data made available through e-tax. The ideal skillset for this is neither accounting and audit expertise nor ICT skills, but rather the types of skills developed by statisticians, actuaries, and mathematicians trained and skilled at finding patterns in large volumes of data.

To get the full value from the ICT investments of e-tax, therefore, tax administrations must include in their plans and development strategies recruitment or development of functional staff capable of data mining and data analytics, with ICT support on how to use the tools it provides to acquire data and with audit and enforcement program support on results achieved using risk profiles.

The Korean case study provides clear evidence of the immediate e-payment effect on businesses and individual taxpayers as they become aware of the tax administration's improved third-party data matching capability. The case study also provides excellent examples of the value that can be achieved by developing the analytic capacity to mine big data for compliance, as in the NTS early-warning system for VAT invoicing fraud and related business processes. The OECD paper *Technologies for Better Tax Administration* (2016) provides further elaboration on maturity capabilities in the use of big data, particularly in the section "Tax Administration Digital Maturity Model: Big Data Management."

Large ICT Project Management Challenges

The majority of large ICT projects fail to deliver the planned business functionality within the project's time and cost envelope. They are often implemented late, over budget, and with key functions deferred to later phases. In some cases, they are outright cancelled and deliver nothing. ITMS implementation projects are no exception to this, and to ensure the project succeeds tax administration senior management must pay special attention to the issues inherent to managing large ICT projects and put in place strong ICT project management capability and practices.

1. Long lead time to ITMS implementation (three to five years) elevates project risk factors

ITMS projects can succeed if the following can be sustained for their duration:

- a.** a stable business environment
- b.** a strong executive sponsor
- c.** ongoing tax administration senior management engagement and support
- d.** budget and resources for a team of ICT implementation and business analysts within the tax administration

The project management team must ensure that stakeholders remain engaged with and supportive of the project throughout its life cycle. The difficulties presented by long ITMS time frames are compound when a full BPR project precedes ITMS implementation; this can extend the timeline by one or two years. To minimize lost time, BPR must focus on the areas offering the greatest potential.

Korea was no exception to long implementation timelines. NTS took more than five years to develop NTIS, with the first two years spent on BPR and a feasibility study. Throughout the development period, NTIS had the attention of senior NTS management and received high levels of resources. NTS sometimes used a phased approach to implementation to have some benefit from its work in progress. HTS, for example, was released in three phases from early 2002 (for business income tax) to early 2003 (for indirect taxes) to late 2004 (for corporate and global income taxes). (See Appendix 1 for details.)

2. Scope creep

Functional scope creep often occurs because business owners desire noncore functionality in bespoke solutions or over-customization of commercial off-the-shelf solutions. As a result, timelines and costs expand beyond the original project budget and plan, possibly leading to total project failure.

To avoid this, best practices in ICT project management suggest (i) starting with a project charter, signed by functional areas, clearly defining functional scope, and (ii) establishing strict change management practices to oversee, approve, and make any project plan and budget adjustments considered essential for successful ITMS implementation. Oversight should be managed by the project implementation unit (PIU) supporting the project manager and governed by the Project Steering Committee.

In Korea, owing to strong budget controls, little room was allowed for severe expansion of functional scope. If scope creep had resulted in more time and money costs, NTS would have had to again persuade the budget authority (Ministry of Strategy and Finance) and National Assembly of the project's worth, which would not have been easy. NTS was thus diligent in scope management.

3. Navigating between adopting tax administration good practices that come with a commercial off-the-shelf ITMS solution and doing extensive BPR on key business processes

Doing a BPR process well demands a significant commitment of time and resources from the tax administration. The human resources engaged must be knowledgeable and experienced in current business practices and capable of defining improved "to-be" states for key processes. Often developing countries have insufficient numbers of business analysts to assign to a full-time BPR activity, and those available are often needed to sustain operations. While a BPR project can be supplemented by contracting management, facilitation, and documentation to a firm experienced in these activities, the internal tax administration business knowledge necessary to do BPR well cannot be contracted.

As an alternative to having the tax administration undertake a major BPR initiative that it may not be able to sustain and implement, BPR efforts could focus on a very limited number of high-value key

BOX 1 | Custom-Built Solutions vs. Commercial Off-the-Shelf (COTS) Systems

| Custom-built | COTS |
|--|--|
| <ul style="list-style-type: none"> • More common in large countries with a large number of registrants and high transaction volumes • Allow for intense customization to optimize high-volume transaction processing or customer service delivery quality, time, and cost (meeting taxpayers' and tax administrators' high expectations for level of service) • Requires fully detailed “to-be” state functional specifications, usually including BPR, which implies organizational capability to complete this activity • Takes longer to define, build, and deliver • More prone to significantly exceeding costs and time to delivery due to greater complexity • Requires greater management capacity and expertise • Requires more significant investment in testing • Requires significant in-house or long-term IT service provider expertise to build and sustain | <ul style="list-style-type: none"> • Generally, come with 60 percent of necessary functionality out of the box, based on common features and good practices of tax administrations, thus reducing testing requirements • Intense customization can significantly add to risk and cost • Can be implemented with less investment in “to-be” functional state or BPR, as vendor can configure from current BP definition through fit-gap analysis, followed by configuration and necessary customization • Administrations benefit from good practices embedded in COTS solutions without full BPR process (important where capacity is weak for analyzing functional requirements and BPR) • Faster implementation time (provided products are not customized to the point they are custom-built solutions) • Easier to manage and less prone to significant cost and time overruns • Contract can include ongoing vendor maintenance options and maintenance transition requirements to local IT service provider |

processes and adopt COTS ITMSs, trusting that they are based on best or good practices from other jurisdictions. Such solutions can be good enough and will improve the current processes.

In our Korean case study, NTS had conducted BPR while preparing major ITMS development plans, such as NTIS. NTS thus had a long history and broad experience in ICT development and could manage BPR as a major driver in ITMS requirements implementation.

4. Management of change issues that lead to resistance or rejection of the new ITMS

Poor attention to education, marketing, engagement, and training of management, staff, future users, and external stakeholders (other government departments and taxpayers) often results in significant resistance to any major change, and ITMS implementation is no exception. Detailed change management planning, funds, and project staff and consulting resources must be dedicated to ensuring change management issues are addressed early and well. This falls to the project manager, supported by the PIU, and demands significant engagement and time from senior executives and managers to repeatedly convey the change agenda to all stakeholders and to respond to feedback.

Korea launched TIS in 1997, and in 1999 NTS began a comprehensive, function-based reorganization. Tax officials responsible for filing taxes were a force for change. They had to spend tremendous numbers of hours manually inserting tax return data into terminals connected to TIS. NTS senior

management realized that an e-filing system like HTS would be the best way to resolve this problem, leading to launch of HTS in 2002. The Korean case study shows that proper diagnosis and a well-planned ITMS solution can start a positive chain reaction and achieve goals in a relatively short time.

5. Long-term sustainability of the ITMS solution once the implementation contract is concluded, with capacity in several ICT service management disciplines to manage the ITMS investment

When planning and budgeting ITMS implementation, tax administrations often overlook the ongoing sustainability costs of both the technology infrastructure and the tax solution software. Making arrangements (including budget needs) for either an internal or an external ICT service provider for sustainable infrastructure maintenance and enhancement is critical for long-term effectiveness. In addition, as a general rule, all infrastructure investments (hardware and software) require roughly 20 percent of the initial capital implementation cost to evergreen the environment for sustainability.⁸⁰ This represents an increase in the ICT operating budget that must either be planned for or covered by efficiencies gained from operating costs elsewhere (whether from efficiencies in ICT or in tax program administration). Where ITMS replaces existing solutions, some infrastructure costs may be covered by existing budgets, but usually all old systems must be kept available for several years after implementation, making a direct transfer of costs impossible. Also, developing countries' old infrastructures may not have been kept current and lack a sustainability budget.

Cloud infrastructure service offerings are increasingly becoming viable options for addressing the complexity and cost of infrastructure service needs.

Ongoing maintenance costs for solution software are more variable, as the initial ITMS build consists largely of consulting costs. A best practice in procuring ITMS solutions is to include the first one to two years of maintenance in the contract (in addition to the first warranty year after the system goes into production, the burn-in year), with additional options to renew the maintenance service contract and contract obligations for the vendor to transition and train an alternative maintenance service provider should the tax administration choose to retender or in-source maintenance.

If the tax administration is to reasonably manage the ongoing costs of an ITMS solution, including the cost and quality of future enhancements, it must develop an information technology infrastructure library (ITIL) of skills in several of the common ICT service management disciplines such as:

- service level management (aided through quality service level agreements)
- proactive vendor management
- following best practices in change, release, and problem management

80. Vendor contracts generally charge an 18 to 22 percent annual maintenance fee on all sales contracts (hardware and software) for product third-level support (on site and/or remote), software or firmware upgrades and patches, membership in user support community groups, and an annual envelope of training and consulting support. In some cases a department may not take the maintenance offering, but these are limited.

BOX 2 | The Role of Cloud Services in Tax Administrations

With cloud technologies now mainstream and used heavily in the private sector and increasingly in the public sector, developing countries may be able to use cloud technology to leapfrog the need to build their own ICT server infrastructure and spread the cost out by leasing infrastructure of platform service capacity (IaaS and PaaS) rather than buying it. While this practice is followed in some departments, to date tax agencies have not widely adopted it due to strict concerns around the security and privacy of taxpayer data. The perceived integrity of tax system data is essential to a successful voluntary compliance tax regime. Another reason for the hesitation is that if the public becomes aware of a tax data security or privacy breach, the minister or head of the tax agency will be held accountable (and may possibly be forced to resign), not the cloud service provider that allowed it to occur.

Where tax agencies have adopted cloud technology, it is because the central government has made the infrastructure and e-service offerings available for use by all departments. Under this model, tax data remains inside the secure government network.

If ITMS software as a service (SaaS) becomes available to tax administration agencies in countries with low technological readiness, however, it may make it possible for them to quickly get up and running without having to build and maintain their own ITMS.

In Korea, NTS often outsources major ITMS project implementation such as HTS and NTIS. After those contracts are over, NTS uses a separate, smaller contract for maintenance of the system, engaging either the same IT solution provider who built the system or a different one.⁸¹

Our Korean case study implies that NTS managed all these challenges well, as shown by the successful outcomes of their many ICT change initiatives (TIS, HomeTax, NTIS, ETI, EWS, and ETCR), mostly using its capable internal ICT service provider and significant human resource capacity. NTS's experiences provide evidence that all capacity and capability challenges can be overcome. The case study also illustrates just how long the e-tax administration modernization journey can be. (See Appendix 1, "History of Korea's e-Tax Administration," for details.)

81. "ITCen has a contract with NTS for NTIS maintenance, which is about KRW 16.7 billion," *Mail Business*, December 12, 2016.



Appendix 1: History of Korea's e-Tax Administration

I. Preparation for the introduction of computing system (1966–1970)

- **1966: Establishment of the National Tax Service (NTS)**

The National Tax Service (NTS) was established March 3, 1966. It consisted of four bureaus, 13 departments, 27 groups, one pilot analysis team, four local tax administrations, and 77 tax offices.

- **1968: Establishment of the special team for digitizing tax administration**

The Digitization Team was established under the Office of the Deputy Director for Planning and Management of the NTS Headquarters, which dedicated its efforts to preparing to adopt the computing system. In conjunction with the team, the Data Processing Division of the Research Bureau took part in system design, personnel education, and computer installation.

- **1970: Initial NTS use of computers; Establishment of the NTS IT Center**

The IT Center was established at NTS HQ, and soon after computers and data entry devices were installed for the first time.

II. Taxation data processing-oriented computation (1971–1982)

- **1971: Initiation of tax information computerization**

In 1970, pilot projects for computerizing data processing of withholding tax were undertaken in nine tax offices in Seoul. Thereafter, the projects were expanded beyond withholding tax to incorporate statutory declaration data. Areas of data were expanded to include taxpayers' sales and payments, standard receipts, and tax invoices in all the tax offices nationwide by July 1971.

- **1976: Commencement of global income tax computerization**

As the global income taxation was implemented, income data, which was subject to item-by-item taxation, had to be converted for inclusion. In response, the NTS computerized the aggregate income statements, allowing cross-checks for discrepancies between the income data collected during the given taxation period and the income reported by taxpayers.

- **1977: Initiation of computerized processing of VAT**

With the rollout of VAT in 1977, the NTS adopted the tax invoice cross-checking system to verify business transactions. Using computerized invoice cross-checking, the NTS could find discrepancies

between sales and purchases made among business traders and detect suppressed sales and excessive claims of input VAT.

- ***1981: Initiation of computerized processing of property tax and real estate registration***

As of February 1981, cadaster data collected from the national registration offices was computerized to cover real estate transfer, inheritance, and gift taxation.

III. Expansion of business areas of computing system (1983–1993)

- ***1983: Establishment of two rounds of five-year tax administration computerization plans***

The NTS announced two rounds of five-year tax administration computerization plans, spanning 1983 to 1992, to be implemented in two phases: the first in 1983 and the second in 1988. During this period, focus shifted from data processing to automation of tax administration utilizing computers.

The following are the plans' highlights:

First, the NTS continued system development using digitalized tax data, as in the previous period, to reduce manual operations in tax offices. Major system development included operations for special consumption tax, liquor tax, and taxpayer registration management and tax filing and collection.

Second, the NTS established a national tax database to help regional tax offices manage tax sources. Computer terminals were installed in the tax offices to provide integrated revenue management services.

Third, to improve convenience for taxpayers, the NTS developed tax service systems to address taxpayer queries, issue tax-related certificates, and disseminate tax filing guidelines.

Fourth, the NTS provided education and trainings for tax service staff to improve their computer literacy and capacity, to raise their awareness of the efficiency and advantages of computerization, and to stress the importance of their support for the success of the computerization project.

- ***1985: Establishment and operation of tax information database***

The NTS completed installing computers in the headquarters and local tax service offices and initiating the national tax information database. Tax information and data collected by the local tax services were transferred and centralized, which laid a foundation for evidence- and information-based taxation.

- ***1988: Initiation of computerized national tax collection***

Tax information in the database was categorized by typologies, such as the household income, real estate, and business operator information, to improve data accumulation and use. By the end of 1989, information about real estate transfers, income tax assessment, investigation and assessment of VAT for high-income earners and individual business owner taxpayers was computerized in the database.

By 1990, all information about tax arrears, corporate income tax assessment and investigations, corporate income tax compliance analysis, VAT filing compliance, speculative investment in real estate, tax investigation information, real estate registration, and asset inheritance was computerized. This tax information was made available to frontline staff in tax offices and was expected to improve tax management, including evaluating tax payment compliance and identifying the risks of tax audits.

IV. Foundation for e-tax administration (1994–2000)

- ***1994: Development of the Tax Integrated System (TIS)***

Since previous ICT projects had focused on digitizing tax information, the NTS faced serious challenges dealing with the resulting increase in taxation documents and information. In addition, the introduction of global income taxation on aggregate financial incomes, slated to become effective as of 1996, was expected to lead to increased data processing demand. Against this backdrop, the NTS began developing the TIS in August.

- ***1997: Launch of the TIS***

The TIS connected host computers at the NTS headquarters with all the regional tax offices in the country in a single information network enabling every tax official to conduct real-time online tax administration. It paved the way for systematic management of tax sources and efficient e-tax administration. The TIS resulted in large tax revenue increases with no significant increase in human resource.

The tax revenue increased 3.5 times more, from KRW 590 trillion (approximately US\$520 billion) in 1996 to KRW 2,080 trillion (approximately US\$1,840 billion) in 2015, while the number of tax officers increased only 1.1 times in the same period.

The TIS was developed as an integrated information system supporting core functional areas of tax administration comprising management of (1) tax registration, (2) tax filing, (3) tax collection, and (4) tax information, as well as (5) administrative services for taxpayers. This differentiates it from the previous system focused on data processing each tax item. It thus contributed to the NTS organizational transition in 1999 from an operation based on tax items to one based on functions.

- ***July 1997: Introduction of online tax administration service, including the issuance of tax related certificates***

With the adoption of online tax services—a single network connecting all tax offices in the country—any regional tax office could issue tax-related certificates to taxpayers regardless of their registered place of residence.

- ***March 1999: Launch of the NTS website and the initiation of electronic tax filing***

With the increased use of the Internet, the NTS website was launched in March 1999 to provide tax information and tax-related civil service through the Internet. Electronic tax filing was selected as one of the major reform agendas and the pilot system were tested.

- ***August 1999: Introduction of tax incentives for electronically traceable payments***

Tax incentives were introduced to encourage electronic payments using credit and debit cards. The incentive schemes allowed wage and salary earners to claim tax deductions up to 10 percent of their labor income on purchases made through electronic transactions.

- ***September 1999: Launch of the NTS intranet, the internal communications network***

The NTS launched the TIS, a single real-time network, to connect all government offices. The intranet provided a platform for sharing information and know-how among tax officials in headquarters and local tax offices.

- ***July 2000: Introduction of e-filing of VAT/withholding tax***

Beginning July 2000, the pilot HomeTax e-filing for VAT and withholding tax was tested among the tax agencies in Seoul. The NTS provided e-filing trainings for tax practitioners associations and actively sought suggestions for improvement from the tax agencies.

V. Leapfrogging of e-tax administration

- ***December 2001 to September 2002: Launch of HomeTax Service, establishment Phase 1, full-scale adoption of the HomeTax Service (2002.04)***

With the development of information technology and the increased use of the Internet, HomeTax Service, an integrated web portal for e-filing, e-payment, issuing tax-related certificates, and other tax administration services for taxpayers was launched in April 2002. From July 2002, the service coverage of e-filing through HTS was expanded to all the tax practitioners nationwide.

- ***July 2002 to May 2003: Expansion of HTS Phase 2, providing indirect tax-centered services***

After the massive database system was established in November 2002, electronic tax administration services provided for taxpayers were expanded. In particular, HTS improved to allow not only tax practitioners but also taxpayers to file special consumption tax and liquor tax online. Taxpayers could also file VAT and withholding taxes electronically starting in January 2003.

- ***March 2003: Launch of the Tax Information Management System (TIMS)***

TIMS is an analysis and decision-making system that processes massive tax information accumulated in the TIS to improve revenue management and tax investigation. With the computerization of tax administration, the massive accumulated tax data could be integrated, processed, and stored in a single repository. The system also allowed various data users, including work-level staff, middle managers, and decision makers, to retrieve information and analyze data for their different needs.

- ***October 2003–2004: HTS construction Phase 3, expansion of HTS services to direct taxes***

E-tax filing was expanded to direct taxes, including corporate income tax and global income tax. E-filers could also submit various supporting documents electronically, as required for e-filing. E-tax filing tutorials were developed and added to the HTS.

- ***January 2004: Rolling out the Knowledge Management System (KMS)***

The NTS intranet, launched in 1999 for internal communication, was revamped and developed as the KMS, allowing the know-how of experienced staff to be shared with tax officials nationwide. In 2004, KMS was structured to provide knowledge in thematic areas linking the knowledge database (DB) to the business processing system. In 2011, the knowledge DB was adopted to categorize the information by industries, business types, and transaction types. Known as *Saenggak-narae* (“a stretch of thoughts”), the KMS serves as the communication platform for managing tax payments, revenues, and tax investigations.

- ***January 2005: Rolling out the Electronically Traceable Cash Receipts System***

The Electronically Traceable Cash Receipt System was rolled out to track cash transactions after TIETP were introduced in 1999. With this change, consumers wishing to pay cash could ask vendors for cash receipts. Vendors issue the receipts using their payment terminals and transfer the cash transaction information to the NTS.

As of 2015, around 99 percent of business owners had registered as cash receipt-issuing businesses. The number of cash receipt transactions reached 50 trillion, while the value of the transactions reached KRW 10 trillion (approximately US\$8.8 billion).

- ***November 2006: Rolling out the Tax Law Information System***

The Tax Law Information System provides information, free of charge, on tax laws, regulations, rulings, inquiry decisions, appeals, and judicial precedents. NTS staff started using the system in November 2006, and it was opened to the general public in July 2007. Taxpayers and tax authorities can use it to share the latest tax information equally, encouraging voluntary compliance by taxpayers.

- ***December 2006: Launch of the Simplified Year-end Tax Settlement System***

This system allows wage and salary earners to electronically check and confirm their 12 items of tax deductible expenses collected from public and private institutions and provided by NTS when they file their year-end income tax settlement application. Pre-filled deductible expenses provided by this system included medical expenses, education expenses, insurance premiums, financial transactions, and credit card and cash receipt transactions. The system helped reduce, to a great extent, the time and cost for the wage earners, income tax withholding agents, and third-party information providers. In 2015, 12 million people used this system, and 1.7 billion cases are handled annually.

- January 2009: Initiation of the e-library and e-tax service

The e-library is a database of tax documents submitted by taxpayers and taxpayers' tax service applications, and documents produced by NTS officials. From 2009 to 2011, e-library provided e-tax services through the "paperless e-civil service center." With the launch of the NTIS in 2015, eliminating paper documents, taxpayers were able to submit their tax documents from anywhere in the country. In addition, tax officials' productivity has improved, with the 24/7 access to tax documents whenever necessary.

- **January 2010: Rolling out the e-Invoice Issuance System (e-sero)**

E-sero was adopted to support e-invoicing and was intended to enhance transparency of business transactions and reduce the costs of issuing and storing paper tax invoices. Business owners can issue e-invoices through for free, and since January 2013, by using mobile phones.

History of e-tax invoice system:

- 2010: Adoption of e-tax invoice encouraged, although not compulsory in the first year of implementation
- 2011: Compulsory use of e-tax invoice for corporate businesses
- 2012: Compulsory use of e-tax invoices for individual business entrepreneurs with sales exceeding one billion won (approximately US\$910,000)
- July 2014: Compulsory use of e-tax invoice for individual business entrepreneurs with sales exceeding 300 million won (approximately US\$270,000)

- **January 2010: Launch of the Consolidated International Transaction Analysis System**

This system aimed to integrate fiscal information, including the financial statements and publicly disclosed corporate information and international transactions of multinational enterprises. It supports cross-checking of domestic and international transactions and transfer pricing audits.

- **December 2014: Launch of FOCAS, an integrated analysis system for financial intelligence unit (FIU) information**

With the May 2013 statutory reform of the FIU law (covering reporting and use of certain information on financial transactions), the NTS collected more financial information for tax evasion investigations and delinquent tax collection. The system analyzed Currency Transaction Report (CTR) and Suspicious Transaction Report (STR) reports provided by FIU, together with NTS's tax information to support tax inspection cases.

FIGURE A1.1 | Improvements Following the TIS to NTIS Migration

| TIS | | NTIS |
|---|--|---|
| 1. Integrated system | <ul style="list-style-type: none"> • 8 websites operated independently • User sign-up and log-in required for each website | <ul style="list-style-type: none"> • A single integrated website • One log-in with a single ID and password for the unified website |
| 2. Improved convenience for filing tax returns | <ul style="list-style-type: none"> • Submission of supplementary paper documents for e-filing | <ul style="list-style-type: none"> • Electronic submission available • Extended prior voluntary e-tax return guide and e-filing and prefilled service |
| 3. Advanced My-NTS service | <ul style="list-style-type: none"> • 34 types of services provided, including e-tax filing | <ul style="list-style-type: none"> • Services extended to 62 types • Mail delivery tracking and printing functions added to the services |
| 4. Extended services for online issuance of tax-related documents for taxpayers | <ul style="list-style-type: none"> • 20 types of services provided, including certification of business registration • Services unavailable on Sundays and public holidays | <ul style="list-style-type: none"> • Services extended to 39 types • Services available 24/7 |
| 5. Improved mobile services | <ul style="list-style-type: none"> • 7 mobile apps | <ul style="list-style-type: none"> • Integrated apps |

• **July 2015: Launch of the Next-Generation Tax Integrated System (NTIS)**

The TIS, Home Tax System, and the TIMS improved tax administration productivity and taxpayer services. In 2015, those systems were revamped as NTIS to reflect technological advances and to meet increasing taxpayers’ demands for e-tax administration. The main driver behind NTIS development was the need for an advanced system for comprehensively analyzing tax information.

• **May 2016: Provision of “fully filled service” for small and micro businesses**

NTS provided fully filled income tax filing forms to small and micro businesses. Small and micro businesses can just confirm and submit e-tax return.



Appendix 2: Tax Integrated System (TIS) and New TIS Details

TIS (Tax Integrated System)

TIS is an information system that manages administration and tax data and supports 33 other services, statistical analyses, and interoperability systems. It was designed to increase the efficiency of everyday work processes for tax officers and system end users, and to be revised, as necessary, in accordance with changes in other service portals or support systems developed and added independently and sequentially to legacy systems. Its key roles are as follows:

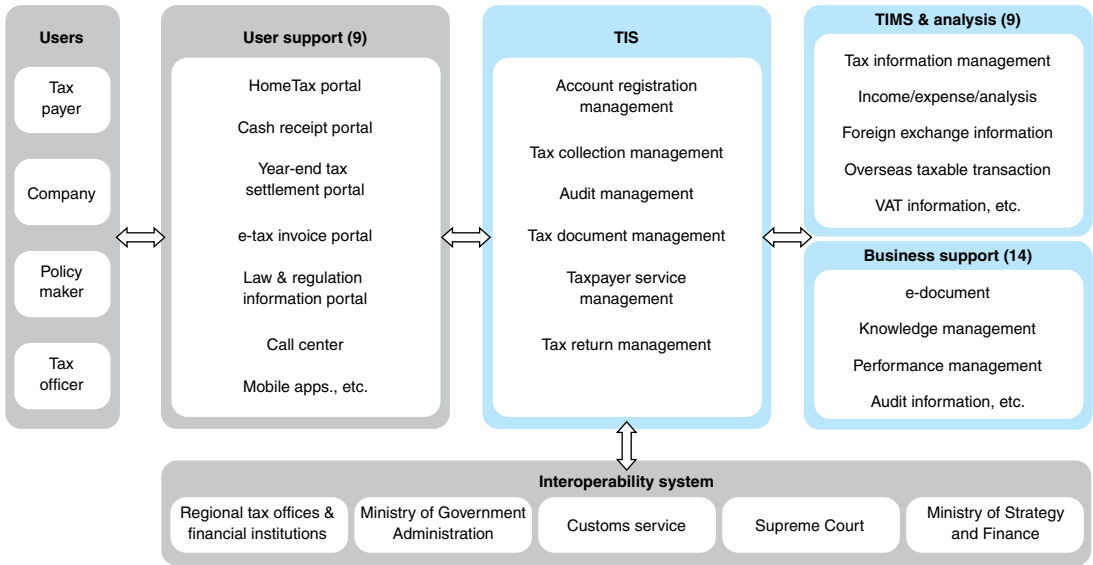
- Tax administration support for government officers
- Integrated database management, covering tax returns, certification of taxpayer and third-party data, etc.
- Support for system interoperability for data and information transactions between third-party organizations and other e-tax systems

In terms of database management and interoperability, TIS played a supporting role, connecting and transferring data and information between other service portal systems and the interoperability system. Most data and information were managed and shared by the interoperability system, providing 183 categories of tax-related data, such as tax returns, credit card use, customs revenue, registration of real estate, and so on. Separate and independent management of data collections (service portal, data analysis, and business support systems), data management and transfer (TIS), and data sharing (interoperability system) led to an inefficient work processes due to duplication of data and technological gaps with systems at other governmental agencies.

For instance, NTS collects necessary data for taxation from other organizations via an interoperability system, such as account data from financial institutions, property, and real estate data from the Supreme Court, identification data from the Ministry of Administration, and so on. It makes aggregate taxation applicable with TIS administration system.

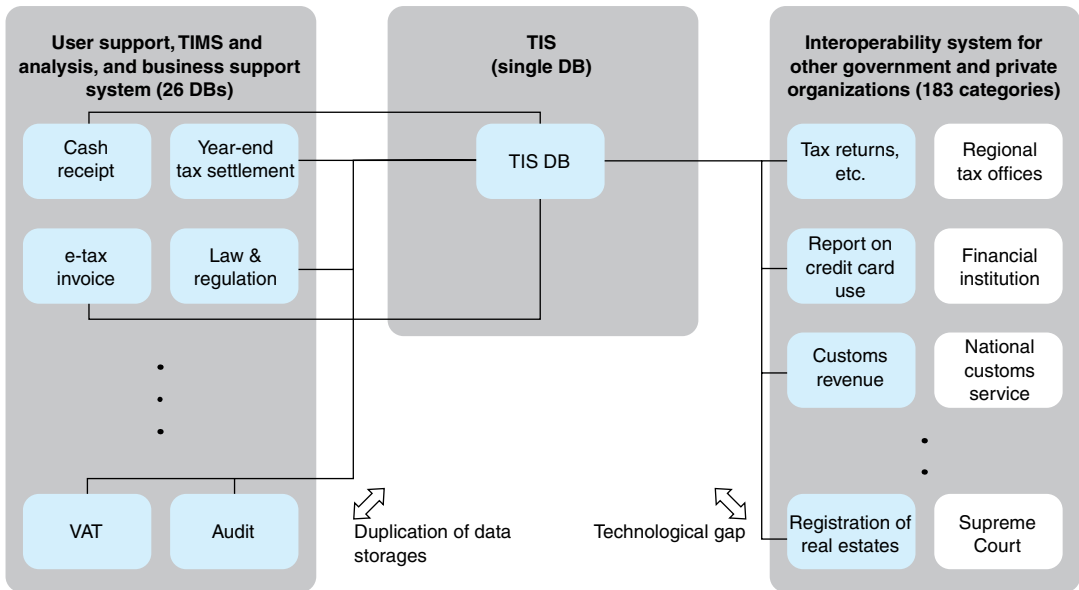
One of the key changes in data management brought about by TIS is management by function rather than region. In TIS, tax data are collected and integrated by function, such as registration, investigation, or tax collection management, and all data and information are managed by entities (individuals and businesses). Tax officials can use the system easily to check and confirm whether registration data are fraudulent and send taxpayers a strong signal to follow tax authority protocol, letting them know the authority has comprehensive data on taxpayers (Choi and Han 2006).

FIGURE A2.1 | TIS and e-Tax Administration Framework



Source: Revised from Korea, NTS 2012c; LG CNS 2012.

FIGURE A2.2 | Data Management and Interoperability of Tax Systems as of 2012



Source: Revised from Korea, NTS 2012c.

In 1999, NTS succeeded in restructuring its organization from a regional to a functional model with the support of TIS. Restructuring had failed three previous times between 1981 and 1991 for lack of data management capacity.⁸² Transformation from a regional organization to a functional organization increased transparency of NTS by weakening the inappropriate relationships between tax officials and taxpayers under the regional organization model. (Choi and Han 2006)

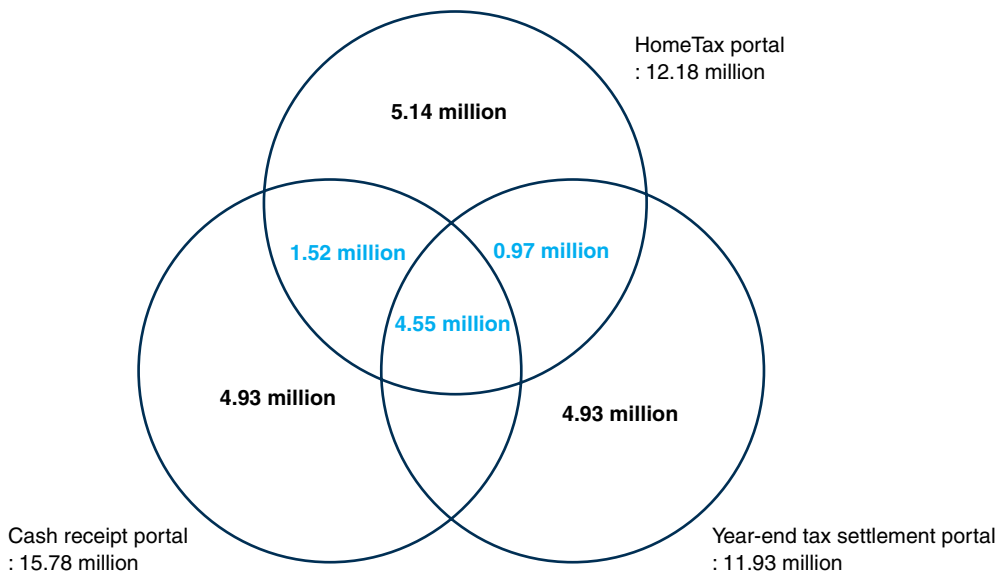
Drivers and Challenges for NTS Enhancement

Although recognized as one of the success stories of e-governance implementation in Korea, as a pioneer system, TIS has two decades of development history. During this journey to becoming a world-class tax administration, some pitfalls and challenges were encountered.

- Technical complexity and inefficiency of administration
 - Closed system with IBM mainframe vs. UNIX based or other open systems
 - Duplication of subscribers in different systems
- Duplication of investment: dual management and operation of databases

For instance, until 2012, NTS kept duplicate subscriber data in its subsystems. It is not surprising that the next-generation integrated tax system, in high demand for retrieving data on 1.52 million subscribers, was duplicated on the HomeTax and cash receipt portal systems.

FIGURE A2.3 | Number of Subscribers of e-Tax Systems as of 2012



Source: Korea, NTS 2012a.

82. NTS found out the functional organization was not applicable without data management capacity because it required interoperability and data sharing.

NTIS: Next-Generation Tax Integrated System

The NTS amended and finalized its business plan for NTIS (Next-Generation Tax Integrated System) in 2013. Having studied its feasibility and economic viability, NTS assessed the risk factors in the implementation plan, knowing they would have to be carefully managed.

- *Significant financing needs:* Total investment cost would be between 10 and 20 percent of the annual NTS budget.
- *Complexity of project management:* The work would be broad in scope of work and of high technical complexity.
- *High technological complexity:* Risks are inherent in data migration and interoperability.

In the consideration of risk factors, the plan was implemented with the following directions:

- The system should be the one integrated tax system for efficient management, integrated information resource management, compatibility of information, and integration of service channels.
- The system should be developed and implemented as a single project (“Big-Bang” approach) to avoid duplication of investment and to integrate and harmonize all subsystems.
- The project should be executed in several phases in consideration of the government budget plan, risk factors, technological complexity of system development, integrity of data, and availability of resources for the project.

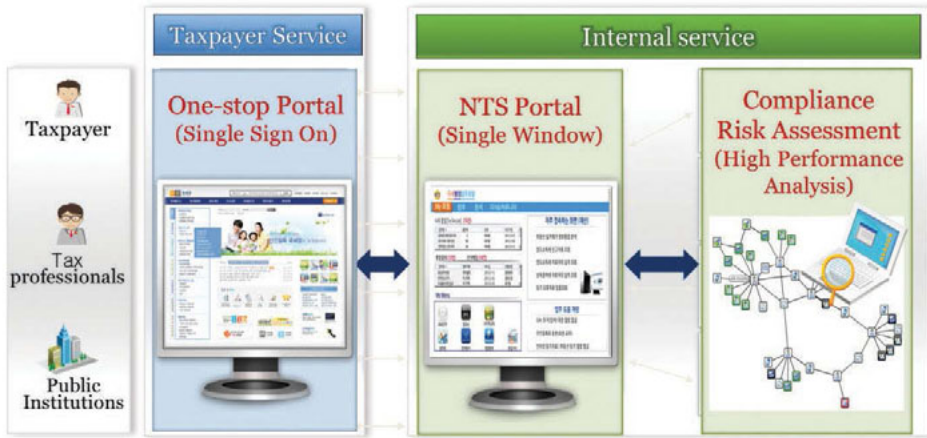
The NTIS has no independent stand-alone service portals or systems. It consists of one integrated taxpayer service portal for external users and another single-window portal for internal users only. By integrating portals and systems, NTIS allows citizens and businesses to access various tax services through a one-stop portal (external portal), while government officers continue their work on the internal portal.

TABLE A2.1 | Summary of the NTIS project

| Project information | Description |
|--|--|
| Objective | Flexible and integrated system |
| Project duration | 2010 to 2015 (5.5 years) |
| Budget | About US\$200 million |
| Average monthly manpower involved in the project | 360 people per month |
| Number of programs developed | 22,300 programs |
| Number of data migrated | 180 billion data |
| Key scope of work | Integrated Administration System (NTIS) and DB Integrated Service System (HomeTax Portal) |

Source: Korea, NTS 2012c.

FIGURE A2.4 | Service Architecture of NTIS

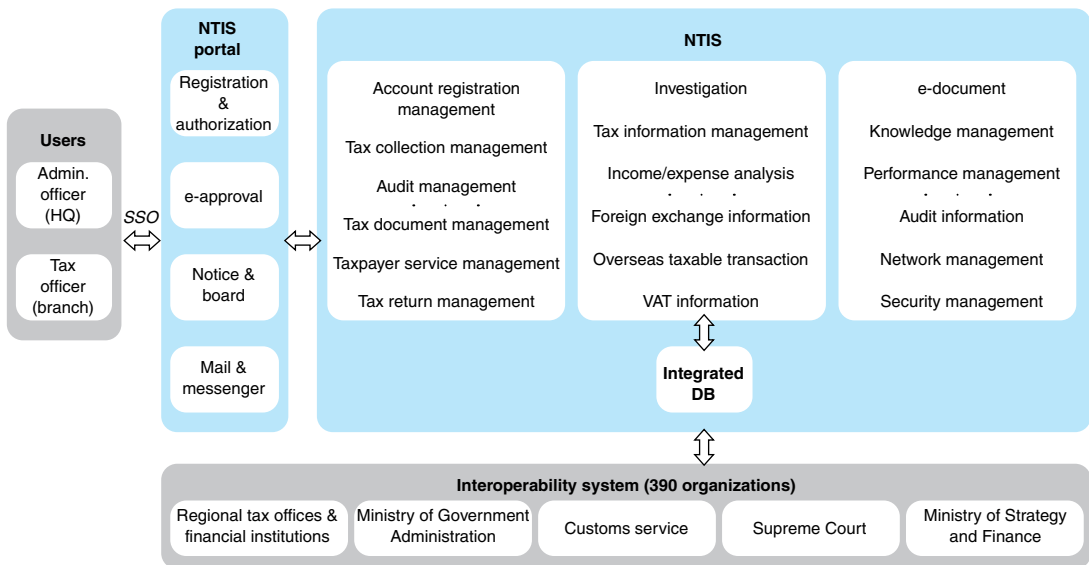


Source: Revised from Korea, NTS 2012c.

- *External service portals:* Nine websites for user services are integrated into a one-stop portal with single sign-on (SSO).
- *Internal management systems:* TIS and 14 business support systems and interoperability systems are integrated into a single NTS portal system.
- *Internal analysis systems:* Nine information management and statistical analysis systems are integrated into a single compliance risk assessment system.

NTIS contains 26 databases, including TIS DB, HomeTax DB, and cash receipt DBs, integrated into a single master database to support the NTIS internal management system. The National Tax Service

FIGURE A2.5 | NTIS and e-Tax Administration Framework



Source: Revised from Korea, NTS 2016a.

shares data and information with 390 other governmental organizations using the interoperability system, which is managed and supported by the NTIS internal management system and master database.

The following lists some additional advanced service or systems developed and added to NTIS:

- *e-Cabinet*: Digital library for all documents, including paper tax registrations, etc.
- *Automated postal service system*: Automation of drafting, sending, managing of notices
- *Work management*: Customized support system for work processes, including to-do lists, work schedules, progress reports, etc.
- *Data analysis portal*: Integrated statistical analysis portal

Benefits of NTIS Implementation

According to the NTIS preliminary feasibility study conducted in 2011, economic benefit in monetary value is estimated at US\$396 million (net present value estimation) in total. The benefit estimates include time and money savings for external users of tax portal services, such as citizens and businesses, and increased work efficiency for internal government officers.

- **Cost of taxpayer (external)**
 - Consultation by phone
 - Registration
 - Tax payment
 - Visiting tax office
- **Cost of tax administration (internal)**
 - Investigation and assessment
 - Postal service
 - Call center
 - System operation of tax administration
- **Cost of system operation (internal)**
 - Network line
 - Operation and maintenance
 - Installation of equipment, etc.

Assuming that most of the internal benefit derives from NTIS administrative systems, the economic benefit of NTIS, exclusive of the NTIS portal, is estimated at US\$348 million in net present value.

TABLE A2.2 | Estimated Benefits of NTIS (*unit: million KRW*)

| Year | 1) Cost reduction of taxpayer | 2) Cost reduction of tax administration | 3) Cost reduction of system operation | Total (NPV) |
|-----------------|-------------------------------|---|---------------------------------------|----------------|
| 2015 | 2,977 | 4,173 | 101,549 | 78,834 |
| 2016 | 4,836 | 6,915 | 44,135 | 38,418 |
| 2017 | 6,695 | 9,657 | 44,135 | 39,413 |
| 2018 | 8,553 | 12,399 | 44,135 | 40,200 |
| 2019 | 10,412 | 15,141 | 44,135 | 40,797 |
| 2020 | 12,271 | 17,883 | 101,549 | 73,083 |
| 2021 | 12,271 | 17,883 | 44,135 | 39,074 |
| 2022 | 12,271 | 17,883 | 44,135 | 37,037 |
| 2023 | 12,271 | 17,883 | 44,135 | 35,106 |
| 2024 | 12,271 | 17,883 | 44,135 | 33,276 |
| Subtotal | 94,826 | 137,699 | 556,178 | 455,239 |
| Total | 94,826 | | 693,877* | 455,239 |

Source: KDI 2011.

Note: *Increase of administrative efficiency; NPV total estimated at about US\$348 million.

Inferences for Developing Countries

The experience of the National Tax Service of Korea provides useful lessons for other countries. The key system and service improvements can be summarized as follows:

- *More for taxation policy than ICT policy:* The e-tax system in Korea was developed and evolved through follow-up systems to support not only national ICT strategy and policy but also national finance and taxation policy.
- *Regional to functional organizational structure transition:* Implementation of tax administration systems can contribute to transparency and efficiency in tax organizations by supporting the transition from a regional to a functional structure.
- *Asymmetric to symmetric information:* The tax authority's ability to data match its integrated database of income sources and transaction histories against third-party sources can increase taxpayer compliance.
- *Top-down to bottom-up:* TIS was initially implemented to increase data management efficiency in support of government finance and taxation policy, but it kept expanding its range of services and improving service quality according to the priorities and needs of NTS.
- *Addressing internal and external user needs:* NTS first focused increasing work efficiency; it continued expanding its services to increase tax administration effectiveness.

- *After the Big Bang*: TIS and other tax service portals were developed sequentially and added to legacy systems despite limited government budget, technical capacity, and readiness and overall changes in economic growth. Legacy system inefficiencies were an ongoing issue, and these difficulties made the business case for NTS to develop an integrated system, NTIS, in a “Big-Bang” to deal with the technological complexity.

Lessons learned from TIS’s development history will be helpful for governments of developing countries to consider, particularly the following:

- E-tax systems should be developed and managed with system compatibility and flexibility in mind to better support changes in national finance and taxation policy.
- The “incremental development and add-on” approach to stand-alone systems might lead to inefficient operations and management by increasing technical complexity and integration costs.
- Component-based development and systems based on government enterprise architecture, if any, can help avoid system inefficiency and complexity as national taxation policy changes.
- An integrated architecture encompassing provision of services, consideration of ease of data transactions between systems, and interoperability with the systems of other organizations can be critical to the success of a tax administration system.



Appendix 3: Details of Survey on Korean Compulsory ETI

TABLE A3.1 | Demographics of Respondents

| | | | |
|--------------|---------------------------------|------------|---------------|
| Occupation | Tax accountant and practitioner | 111 | 33.4% |
| | CPA | 140 | 42.2% |
| | Lawyer | 15 | 4.5% |
| | Business taxpayer | 44 | 13.3% |
| | Others | 22 | 6.6% |
| Age | 20s | 59 | 17.8% |
| | 30s | 151 | 45.5% |
| | 40s | 46 | 13.9% |
| | 50s | 28 | 8.4% |
| | 60s | 36 | 10.8% |
| | 70s and over 70s | 12 | 3.6% |
| Gender | Male | 230 | 69.3% |
| | Female | 102 | 30.7% |
| Total | | 332 | 100.0% |

TABLE A3.2 | Contingency Table of Response and Results of Chi-Square Tests

| Questions | Respondents group | Strongly disagree | Disagree | Neutral | Agree | Strongly agree | Sum | Chi-square test |
|--|--------------------|-------------------|------------------|--------------------|-----------------|----------------|-----|--|
| 1. Do you think there are many VAT evasion cases in Korea, such as underreporting sales or creating fake invoices? | Tax practitioners | 21 | 111 | 80 | 46 | 8 | 266 | $\chi^2 = 1.6152$, df = 4, p-value = 0.8061 |
| | Business taxpayers | 3 | 16 | 13 | 11 | 1 | 44 | |
| | Sum | 27 | 133 | 99 | 63 | 10 | 332 | |
| 2. Do you think compulsory ETI will significantly contribute to curbing VAT evasion by enhancing transaction transparency (i.e., real-time access to transaction information)? | Tax practitioners | 4 | 23 | 48 | 165 | 26 | 266 | $\chi^2 = 4.5181$, df = 4, p-value = 0.3404 |
| | Business taxpayers | 0 | 4 | 13 | 25 | 2 | 44 | |
| | Sum | 5 | 28 | 69 | 201 | 29 | 332 | |
| 3. Do you think compulsory ETI has improved taxpayer service by facilitating tax filing, for instance, through automation of invoice issuance? | Tax practitioners | 4 | 29 | 41 | 169 | 23 | 266 | $\chi^2 = 4.0736$, df = 4, p-value = 0.3961 |
| | Business taxpayers | 0 | 1 | 7 | 32 | 4 | 44 | |
| | Sum | 5 | 32 | 53 | 211 | 31 | 332 | |
| 4. What is your opinion about scaling up the obligation of ETI henceforth? | Tax practitioners | 15 | 43 | 56 | 111 | 41 | 266 | $\chi^2 = 3.8349$, df = 4, p-value = 0.4288 |
| | Business taxpayers | 0 | 5 | 9 | 22 | 8 | 44 | |
| | Sum | 17 | 49 | 69 | 143 | 54 | 332 | |
| 5. Do you think taxpayers' burden increased after the introduction of compulsory ETI? | Tax practitioners | 6 | 42 | 72 | 125 | 21 | 266 | $\chi^2 = 6.0715$, df = 4, p-value = 0.1939 |
| | Business taxpayers | 1 | 13 | 11 | 18 | 1 | 44 | |
| | Sum | 10 | 60 | 88 | 152 | 22 | 332 | |
| 6. Do you think electronic tax administration, including ETI, reduces the possibility of tax evasion? | Tax practitioners | 3 | 25 | 53 | 157 | 28 | 266 | $\chi^2 = 4.3684$, df = 4, p-value = 0.3584 |
| | Business taxpayers | 0 | 5 | 12 | 26 | 1 | 44 | |
| | Sum | 4 | 35 | 68 | 193 | 32 | 332 | |
| 7. Do you think businesses file more accurate VAT returns after the compulsory ETI? | | More accurate | Equally accurate | Equally inaccurate | More inaccurate | | Sum | $\chi^2 = 4.0453$, df = 3, p-value = 0.2566 |
| | Tax practitioners | 196 | 57 | 12 | 1 | | 266 | |
| | Business taxpayers | 37 | 4 | 3 | 0 | | 44 | |
| | Sum | 252 | 63 | 16 | 1 | | 332 | |



Appendix 4: Data and Methodology Used for Quantitative Analysis of TIETP

Household Income and Expenditure Survey

The Household Income and Expenditure Survey (HIES) is collected, compiled, and released by Statistics Korea. Thousands of households are included in each layer of cross-sectional samples, up to roughly 10 thousand. Every household is surveyed monthly for three to five years, and results are compiled and released on a quarterly basis. Households are preassigned unique identification numbers by Statistics Korea, allowing easy conversion of monthly or quarterly information into annual values by household. After three to five years, households in the sample are replaced with new households. Several households are typically replaced sooner, however, if they become unable to participate for any reason, such as moving without notice or abroad, abrupt refusal, demise, divorce, and so on.

Descriptive statistics for the 2014 HIES are reported in Table A4.1.

TABLE A4.1 | HIES 2014 Descriptive Statistics (unit: thousand KRW)

| | Average | Standard deviation | Maximum | Minimum |
|---|---------|--------------------|---------|---------|
| Age of head | 52.34 | 14.03 | 95 | 17 |
| Household size (number of family members) | 2.75 | 1.26 | 8 | 1 |
| Number of income earners | 1.25 | 0.88 | 6 | 0 |
| Market income | 43,305 | 31,490 | 300,868 | 0 |
| Gross income | 48,088 | 30,254 | 300,354 | 0 |
| Disposable income | 43,858 | 25,996 | 289,418 | 0 |
| Consumption expenditure | 26,534 | 16,896 | 213,639 | 925 |
| PIT for wage/salary and business income | 1,775 | 3,358 | 55,607 | 0 |
| Property tax burden | 204 | 391 | 5,686 | 0 |
| Social security contributions | 2,432 | 2,411 | 43,561 | 0 |
| Private transfer income | 2,421 | 8,025 | 104,824 | 0 |
| Public transfer income | 2,362 | 6,312 | 86,653 | 0 |

Note: The 2014 HIES consists of 4,904 households. It is annualized from quarterly variables.

Methodology of PIT Estimation

Personal income tax (PIT) burdens were estimated using the annualized HIES dataset and the Korean national tax simulator program (KNTS) developed by the Korea Institute of Public Finance, a tax liability calculator similar to TAXSIM, used by the National Bureau of Economic Research.

PIT burdens were estimated separately for wage and salary income earners and for self-employed business income earners. PIT burdens of wage and salary income earners were calculated directly from the KNTS, using the raw income data in HIES, under the assumption that wage and salary income earners reported their true income honestly in the survey. Given the tendency of the self-employed to under-report their income, however, even in the survey, income data reported in HIES by the self-employed were modified for PIT calculations by adopting Sung's methodology (1999). Further, the assumption was made that all business income earners were risk neutral and, as a result, that their tax compliance rates were all the same. First, the real business income of each household was estimated by comparing income-consumption patterns between wage and salary earners and the self-employed, as is done by Pissarides and Weber (1989). Second, the business income reporting ratio (β) in the following formula was estimated through the iterative method.

$$\frac{\sum PIT(\beta \times RBI)}{\beta \times \sum RBI} + \frac{PIT_{rev}}{N}$$

β is the ratio (of business income reported to NTS over real business income, RBI is real business income estimated in the first step; is the PIT burden of reported business income () of each household calculated by the KNTS; is the total PIT revenue from business income given in the *Statistical Yearbook of National Tax* (NTS 2015); and is the total number of PIT taxpayers of business income given in the *Statistical Yearbook of National Tax* (Korea, NTS 1998–2015). Lastly, the PIT burdens of business income per household in each decile were estimated by KNTS using the real business income (RBI), business income reporting ratio (β), and demographic data in HIES.



Appendix 5: Quantitative Analysis for TIETP Methodology and Data

TIETP's effects were analyzed using microsimulation methods through counterfactual analysis adopted by Song and Sung (2012). This study updated the Song and Sung (2012) approach, using 2014 as the HIES dataset. Three different scenarios were set up to evaluate policy effects by establishing the counterfactual and the observable. When estimating true business income in each scenario, income data obtained from HIES were adjusted under the assumption that they were also underreported, as in tax reporting.⁸³ Real business incomes were estimated by comparing the income and expenditures of self-employed workers with those of wage and salary earners. The ratio of business income reported to tax authorities over real business income as of 2014 was estimated by applying the same method employed in Sung (1999, 2008). Business income reported to tax authorities per household was estimated with the real business income and income reporting ratio obtained in the previous stage. The PIT burden was calculated based on the business income reported to tax authorities, as well as demographics and expenditure data obtained from HIES. It was assumed, however, that wage and salary income were reported correctly. The detailed methodology is described in Appendix 4. Following are the three scenarios employed.

Scenario A (*counterfactual Scenario 1: baseline*). Average PIT burden per household in 2014 was estimated under the assumption that business income earners reported their income based on the past increasing trend without the intervention of TIETP. The average reported business income in 2014 was estimated by extrapolating the past ratio of business income earners' reported income to their real income. In this study, Sung's estimate (1999) for the ratio of business income earners' reported income to real income in 1996 (47.7 percent) and another Sung estimate (2008) for 2001 (53.9 percent) were used to linearly extrapolate the estimate for 2014.⁸⁴ It should be noted that the 2001 estimate was used for extrapolation, considering the estimates between 1997 and 2000 as outliers due to the financial crisis in Korea, and that if the 2001 estimate affected by TIETP at the early stages of TIETP introduction were extrapolated as a baseline, it would underestimate the effect of TIETP when compared to the observable. In other words, because extrapolation using inflated data would result in a conservative estimate of the TIETP effect, we compromised by using the 2001 estimate.

83. Hurst, Li, and Pugsley (2014) showed that in U.S. household surveys the self-employed systematically underreport their income by about 25 percent.

84. When the two data points (Y_{t_1}, t_1) and (Y_{t_2}, t_2) are given, the linear extrapolation function will be $Y(t^*) = \frac{Y_{t_2} - Y_{t_1}}{t_2 - t_1} \times (t^* - t_1) + Y_{t_1}$. In our case, it will be $Y(t^*) = 1.24t^* - 2427.34$. Therefore, the reported income to real income ratio in 2014 was $Y(2014) = 70.1(\%)$.

It was assumed that this counterfactual scenario only included tax base broadening effects caused by factors other than TIETP. Those factors could be taxpayers' voluntary compliance, tax authorities' tax enforcement efforts, or other unknown socioeconomic changes. Therefore, this counterfactual scenario reflected all causal factors other than TIETP, thus differentiating them from TIETP effects.

Scenario B (*counterfactual Scenario 2*). The average PIT burden per household in 2014 was estimated under the assumption that TIETP is in effect but has not led to tax losses. The average reported business income was estimated by applying the ratio of reported business income to real business income, which reflected the base broadening effects of TIETP. When estimating the PIT burden, however, contrary to the facts, tax forgone for TIETP was not factored in. Accordingly, this scenario shows the gross effect of TIETP's base broadening as of 2014 under the assumption that the same tax base broadening effects caused by TIETP were realized without tax revenue loss for TIETP.

Scenario C (*observable scenario*). The average PIT burden per household in 2014 was estimated under the current Income Tax Act, as of 2014, which includes TIETP. Tax forgone for TIETP was also factored in when calculating the average PIT burden.

The comparison among these scenarios will show how much TIETP broadened the tax base and increased tax revenue on average in 2014, and how much tax revenue was forgone to finance TIETP. The difference between Scenarios A and B (①) illustrates the gross base broadening effect of TIETP on tax revenue. The difference between Scenarios B and C (②) will show the revenue cost to finance TIETP. The gap between the two differences (①-②) is the net gain of TIETP. TIETP would be justified only when its net gain is positive.

Tax Revenue Effects of TIETP

Table A5.1 illustrates the average income and PIT estimation per household by decile as of 2014. The table consists of four sections. The first nine rows display the distributions of the average income, PIT burdens, and the revenue effects of TIETP by decile as of 2014. The second section, the next six rows, indicates the relative ratios of each income and PIT to gross income. The third section, the following three rows, indicates the ratios of PIT burdens to wage and salary income or business income, that is, the effective PIT rates. The fourth section, the last six rows, indicates the shares of each income and PIT by decile.

Gross revenue effects of TIETP (GE), the difference between Scenario B and A ranges from KRW 3,000 to KRW 704,000 by decile. Tax forgone for TIETP (TF), the difference between Scenario B and Scenario C, ranges from zero to KRW 317,000. Therefore, net gains of TIETP ranges from KRW 3,000 to KRW 387,000. On average, gross revenue effects of TIETP are KRW 186,000; the cost of TIETP, KRW 108,000; the net effect, KRW 78,000. In sum, TIETP is quite costly but still yields positive tax revenue increases.

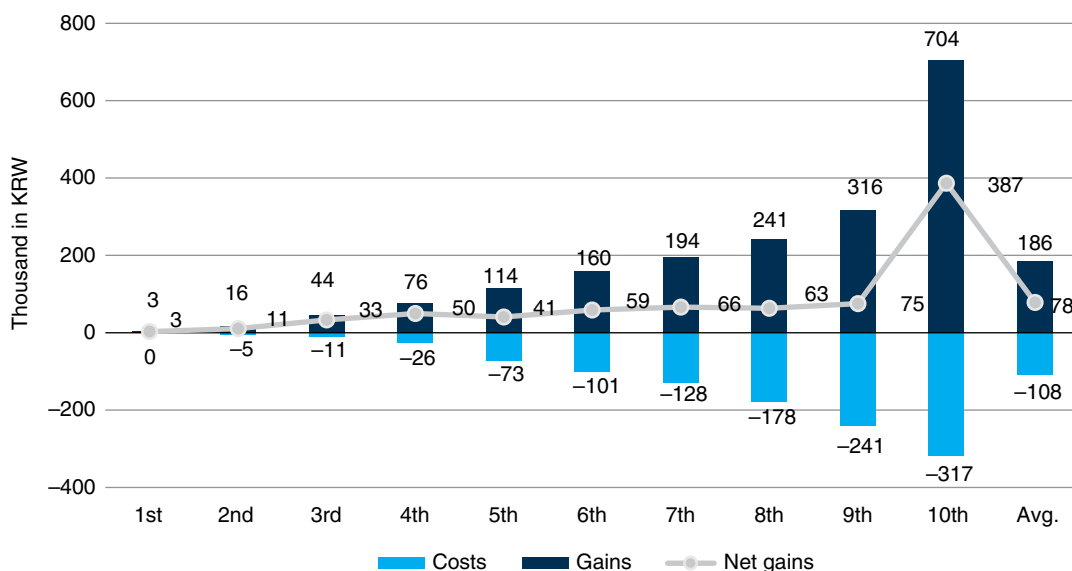
TABLE A5.1 Distribution of Average Income and PIT Burden per Household by Gross Income Decile

| | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | Avg. |
|----------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|--------------|
| (thousand KRW) | | | | | | | | | | | |
| MY | 6,425 | 13,526 | 20,948 | 28,186 | 34,946 | 40,503 | 49,322 | 58,353 | 71,975 | 106,312 | 43,046 |
| GY | 10,456 | 18,383 | 25,769 | 32,866 | 39,752 | 46,557 | 54,083 | 63,508 | 77,086 | 112,455 | 48,088 |
| GN & BY | 3,584 | 9,749 | 17,087 | 24,215 | 31,906 | 37,690 | 46,463 | 54,889 | 68,011 | 99,601 | 39,316 |
| Scenario A | 10 | 72 | 191 | 378 | 698 | 1,015 | 1,500 | 2,437 | 3,741 | 8,670 | 1,871 |
| Scenario B | 13 | 88 | 235 | 454 | 812 | 1,175 | 1,694 | 2,678 | 4,057 | 9,374 | 2,057 |
| Scenario C | 13 | 83 | 224 | 428 | 739 | 1,074 | 1,566 | 2,500 | 3,816 | 9,057 | 1,949 |
| GE (B-A) | 3 | 16 | 44 | 76 | 114 | 160 | 194 | 241 | 316 | 704 | 186 |
| Revenue effect | 0 | -5 | -11 | -26 | -73 | -101 | -128 | -178 | -241 | -317 | -108 |
| NE (GE+TF) | 3 | 11 | 33 | 50 | 41 | 59 | 66 | 63 | 75 | 387 | 78 |
| Ratios to GY (%) | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | Avg. |
| MY | 61.45 | 73.58 | 81.29 | 85.76 | 87.91 | 87 | 91.2 | 91.88 | 93.37 | 94.54 | 89.52 |
| GY | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| GN & BY | 34.28 | 53.04 | 66.31 | 73.68 | 80.26 | 80.95 | 85.91 | 86.43 | 88.23 | 88.57 | 81.76 |
| Scenario A | 0.1 | 0.39 | 0.74 | 1.15 | 1.76 | 2.18 | 2.77 | 3.84 | 4.85 | 7.71 | 3.89 |
| Scenario B | 0.13 | 0.48 | 0.91 | 1.38 | 2.04 | 2.52 | 3.13 | 4.22 | 5.26 | 8.34 | 4.28 |
| Scenario C | 0.12 | 0.45 | 0.87 | 1.3 | 1.86 | 2.31 | 2.9 | 3.94 | 4.95 | 8.05 | 4.05 |
| Ratios to GN & BY (%) | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | Avg. |
| Scenario A | 0.29 | 0.74 | 1.12 | 1.56 | 2.19 | 2.69 | 3.23 | 4.44 | 5.5 | 8.71 | 4.76 |
| Scenario B | 0.37 | 0.9 | 1.37 | 1.88 | 2.54 | 3.12 | 3.65 | 4.88 | 5.97 | 9.41 | 5.23 |
| Scenario C | 0.35 | 0.85 | 1.31 | 1.77 | 2.32 | 2.85 | 3.37 | 4.55 | 5.61 | 9.09 | 4.96 |
| Shares by decile (%) | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | Total |
| MY | 1.49 | 3.14 | 4.87 | 6.55 | 8.12 | 9.41 | 11.46 | 13.56 | 16.72 | 24.7 | 100 |
| GY | 2.17 | 3.82 | 5.36 | 6.83 | 8.27 | 9.68 | 11.25 | 13.21 | 16.03 | 23.39 | 100 |
| GN & BY | 0.91 | 2.48 | 4.35 | 6.16 | 8.12 | 9.59 | 11.82 | 13.96 | 17.3 | 25.33 | 100 |
| Scenario A | 0.06 | 0.39 | 1.02 | 2.02 | 3.73 | 5.42 | 8.02 | 13.03 | 20 | 46.35 | 100 |
| Scenario B | 0.06 | 0.43 | 1.14 | 2.21 | 3.95 | 5.71 | 8.23 | 13.02 | 19.72 | 45.56 | 100 |
| Scenario C | 0.06 | 0.43 | 1.15 | 2.19 | 3.79 | 5.51 | 8.03 | 12.82 | 19.57 | 46.46 | 100 |

Source: Authors' estimates using data from HIES 2014.

Note: a. MY, GY, GN & BY, and PIT denote market income, gross income, wage and salary and business income, and personal income tax, respectively. b. GE denotes the gross revenue effect of TIETP. TF denotes tax revenue forgone for TIETP. NE denotes net effect of TIETP.

FIGURE A5.1 | Tax Revenue Effects of TIETP per Household by Decile in 2014



Source: Authors' depiction.

Figure A5.1 graphically shows these revenue effects. Net gains in the PIT burden increase as income increases. The net gain curve is upward at an accelerating rate. In particular, revenue gains in the 10th decile are striking. TIETP increases the PIT burden of higher income earners more than that of lower income earners, although it gives more tax relief to them.

Table A5.2 shows the total PIT revenue effect, which was calculated by multiplying the average PIT burden per household and the total number of households (18,001,541 households in 2014). The total gross effect of TIETP was KRW 3.4 trillion, while the cost of TIETP reached KRW 1.9 trillion. The net gain was estimated at KRW 1.4 trillion (approximately US\$1.3 billion), which increased PIT revenue by 4.2 percent as compared to the baseline Scenario A without the intervention of TIETP. If the revenue increase in VAT and CIT is considered, the revenue impact of TIETP would be much larger.

TABLE A5.2 | Total PIT Revenue Impact of TIETP

| | | Avg. (thousands in KRW) | Total (billions in KRW) |
|----------------|------------|-------------------------|-------------------------|
| PIT | Scenario A | 1,871 | 33,675 |
| | Scenario B | 2,057 | 37,036 |
| | Scenario C | 1,949 | 35,090 |
| Revenue effect | GE (B–A) | 186 | 3,361 (10.0%) |
| | TF (C–B) | -108 | -1,946 (-5.8%) |
| | NE (GE+TF) | 78 | 1,415 (4.2%) |

Note: Numbers in parentheses under "Revenue effect" indicate the percentage increase from the revenue in baseline Scenario A.

Effects on Tax Equality

Table A5.3 shows changes in the Gini coefficient between gross income and gross income less PIT. PIT under the baseline Scenario A, without the intervention of TIETP, decreased Gini coefficient from 0.3357 to 0.3230 by -3.79 percent. When TIETP is considered (as in Scenario C), it decreased to 0.3227 by -3.90 percent. This enhanced income redistribution was undermined by 0.14 percentage points (from -4.04 percent to -3.90 percent) by the tax forgone for TIETP, however, which was unevenly given to higher income deciles due to the progressive tax structure. The Gini coefficient would have decreased to 0.32216 by -4.04 percent if there were only the same tax broadening effect as with TIETP but no tax forgone for TIETP. In sum, TIETP had a positive impact on income redistribution due to the broadened tax base, despite the greater tax relief given to higher income earners. The Gini coefficient decreased by 0.11 percentage points (from -3.79 percent to -3.90 percent). This means that the tax base broadening impact of TIETP on income redistribution outweighs its negative effect on income redistribution caused by tax relief, and as a result it eventually enhanced income redistribution.

TABLE A5.3 | Changes of Gini Coefficients

| | Scenario A | Scenario B | Scenario C |
|--|--------------|--------------|--------------|
| MY | 0.36942 | | |
| GY | 0.33574 | | |
| GY less PIT | 0.32303 | 0.32216 | 0.32265 |
| % change between GY and GY less PIT | -3.79 | -4.04 | -3.90 |

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