

Can Electronic Tax Invoicing Improve Tax Compliance?

A Case Study of the Republic of Korea's Electronic Tax Invoicing for Value-Added Tax

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Abstract

This paper reviews the Republic of Korea's experience with electronic tax invoices for its value-added tax regime from the perspectives of tax policy makers and administrators. The paper evaluates Korea's implementation of electronic tax invoicing and analyzes its effect on tax compliance through enhanced transparency of business transactions and taxpayer services. First implemented in 2011, mandatory electronic tax invoicing has been credited with lowering tax compliance costs and raising the transparency of business transactions. Effective policy design and implementation have contributed to the country's success with electronic tax invoicing. Measured in transaction value, the electronic tax invoice adoption rate reached 99.8 percent in the first year and rose to 99.9 percent by 2013,

compared with 15 percent before electronic tax invoicing became mandatory. According to a survey of taxpayers and tax practitioners in Korea that was conducted as part of this research study, 69.4 percent of the respondents agreed or strongly agreed that mandatory electronic tax invoicing has contributed to curbing value-added tax evasion by raising transaction transparency, and 72.9 percent agreed or strongly agreed that it has improved taxpayer service by facilitating the convenience of tax filing or automating the issuance of invoices. The review of Korea's experiences gives credence to the contention that well-planned and well-executed compulsory electronic tax invoices can materially enhance tax compliance through significant institutional and perceptual changes in tax administration.

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Key words: Tax compliance, electronic invoice, electronic tax administration, VAT, tax evasion, tax frauds, taxpayer service, tax compliance cost, transparency of business transaction, and informal economy;

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List of Abbreviations

ASP	Application Service Provider
B2B	Business to Business
B2C	Business to Consumer
B2G	Business to Government
DSA	Digital Signature Act
EDI	Electronic Data Interchange
EDIFACT	Electronic Data Interchange For Administration, Commerce, and Transport
ETI	Electronic Tax Invoice
EWS	Early Warning System
KIEC	Korea Institute for Electronic Commerce
KRW	Korean Won
MTIC	Missing Trader Intra-Community Frauds
NTS	National Tax Service
XML	Extensible Markup Language

I. INTRODCUTION

1. Background

The Republic of 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 grown to become a mainstay of the government's tax revenues, reaching KRW58.9 trillion or 29 percent of the entire tax revenues for 2013.¹ However, the need for effective VAT enforcement—especially in respect of curbing VAT refund frauds—remains unabated.

Many countries that have adopted an invoice-credit VAT face more or less the same difficulties with their VAT refund administration when giving credit for input VAT or sometimes refunding excess credits to taxpayers. The difficulty arises from the intrinsic administration of the invoice-credit VAT system, which determines tax liability by deducting tax assessed on a purchase (“input VAT”) from tax assessed on a sale (“output VAT”). Compared to a sales tax or an income tax, VAT is said to be more vulnerable to fraud because of the input VAT credit mechanism (United States Government Accountability Office [GAO], 2008, p. 14). Those critical of VAT contend that the refund mechanism leaves the invoice-credit VAT particularly vulnerable to fraud (Keen, 2007, p. 4). VAT fraud has in fact been observed throughout the developed and the developing countries (Harrison & Krelove, 2005). Across the EU, the phenomenon of missing trader intra-community (MTIC) fraud exploiting VAT refunds for zero-rated exports and deferred VAT payments on imports within the multijurisdictional block has been well established.² Moreover, tax authorities in many developing countries with governance constraints grapple with substantial backlogs of VAT refund applications because of the time taken (varying from several months to more than a year) to verify the legitimacy of VAT refund claims and deter fraud (Harrison & Krelove, 2005, p. 5).

Fraud involving input VAT credit can take various forms. For instance, businesses can file false claims for credit by presenting fictitious invoices, inflating the credit amount by altering invoice information, claiming zero-rating for nonexistent exports or credits on purchases that are not creditable, or even setting up bogus companies to

¹ Five percent of the VAT revenues were allocated to the local governments in 2013, meaning KRW56.0 trillion accounted for 29.4 percent of the total national tax revenue of KRW190.2 trillion for 2013 (*2014 Statistical Year Book of National Tax*, the National Tax Service, 2014).

² MTIC is also called “carousel fraud” because it occurs when an importer pays no VAT on imports but collects VAT on sales and disappears without remitting the VAT collected to the tax authority. Multiple transactions then ensue before goods are exported again to other EU countries with zero-rating refund, through which a whole new process starts again. The U.K. estimated that the size of MTIC fraud varied from £3.5 billion to £4.75 billion in June 2005, and Germany estimated MTIC fraud at €4.5 billion in 2002 (United Kingdom House of Lords European Union Committee, May 2007, pp.12-13).

issue fraudulent invoices (Keen & Smith, 2007). What particularly draws the ire of tax authorities is the fact that VAT fraud constitutes not only nonpayment of taxes due, but also theft of taxes paid by law-abiding taxpayers.

Despite the grave nature of VAT refund fraud, however, tax authorities in both the developed and the developing countries must often deal with the prospect of having to refund excess credits to taxpayers by the statutory deadline³ before the legitimacy of the refund claims can be ascertained. The tax authorities of developing countries generally work to verify VAT refund claims before payment in accordance with their domestic laws and regulations, while those of developed countries employ risk-assessment mechanisms to administer VAT refund claims without verification (Harrison & Krelove, 2005, p. 41). The discrepancy observed in VAT refund administration between the developed and the developing countries is striking but understandable. It is simply unrealistic for the developing countries to abandon their refund verification endeavors and replace them with unfamiliar risk-assessment approaches given the prevalence of refund fraud and the level of distrust that exists between taxpayers and tax authorities suffering from perceived corruption and weak governance.

Given the striking VAT refund practice gap between the developing and developed countries, Korea's implementation of the electronic tax invoice (ETI) and ETI-backed early warning system (EWS) offers new technology-enhanced approaches and sheds new light on VAT enforcement and compliance. This paper reviews potential avenues to establishing more seamless VAT refund systems utilizing information and communication technology (ICT) and lessons from Korea's experience with combating VAT fraud and improving tax compliance with ETI. Korea's drive for a seamless VAT refund system remains a work in progress, but its significant success to date with integrating ICT into the tax administration system should provide important policy lessons to developing countries that are looking to apply ICT to their tax administration in order to improve tax services and compliance.

2. Literature Review

Tax compliance has been a contentious subject in economic studies for the past four decades since Allingham and Sandmo (1972) analyzed tax evasion as utility-maximizing behavior by individual taxpayers. Since then, many researchers have delved into what influences tax compliance. Bărbuță-Mișu (2011) classified factors that contribute to tax compliance into economic factors including tax rates, tax audit, income level, and potential penalties for noncompliance, and noneconomic factors including attitude toward taxes, the personal, social, and national norms, and the perceived fairness of the tax system.

³ According to an IMF survey, 33 out of 36 countries that were surveyed responded that they have a statutory deadline, generally within 30 days, for payment of VAT refunds (Harrison & Krelove, 2005).

Two general approaches are available to tax authorities contemplating a tax reform in order to improve tax compliance. One is an institutional and legislative approach that leverages economic incentives and disincentives such as lower tax rates, increased audit probability, and stiffer penalty for noncompliance to the maximum advantage. The other is a normative and cognitive approach that seeks to cultivate social norm, tax morale, trust in tax system, and the general receptiveness to taxation. To a significant extent, the debate on which approach is more effective remains contentious because of differences in the relative strengths and weaknesses of the two approaches.

Papp and Takáts (2008) demonstrated that tax rate cuts encourage tax compliance and boost tax revenues, while Heinemann and Kocher (2013) showed empirical results that, while tax compliance in a progressive tax system was higher than that in a proportionate tax system, a change from a progressive to a proportionate scheme had a significantly positive impact on tax compliance compared to the reverse change. Freire-Serén and Panadés (2011) on the other hand concluded after extensive literature review that economic studies on the relationship between tax rate increase and tax evasion does not provide a clear outcome in either theoretical studies or empirical studies. With respect to the efficacy of the threat of audit, Snow and Warren Jr. (2005) showed that the uncertainty of audit probability increased tax compliance for ambiguity-averse taxpayers but reduced compliance for taxpayers with no such ambiguity aversion, concluding that fostering audit uncertainty may not be effective because of the heterogeneity of taxpayers' ambiguity preferences. Niu (2011) found that audited firms reported higher sales than non-audited firms, and Tagkalakis (2013) posited that the intensity of an audit induces tax compliance and suggested that greater audit intensity may be a useful enforcement strategy for tax authorities. Kleven et al (2011) showed the result of experiments that, while tax evasion is substantial for self-reported income and very sensitive to the perceived probability of detection from either a prior audit or a threat-of-audit letter, tax evasion of third-party reported income is extremely modest. Pomeranz (2014) also showed that the VAT paper trail system enabling information reporting from the third parties plays a crucial role for effective taxation in the perceived audit probability.

Cummings, Martinez-Vazquez, McKee and Torgler (2009) supported the contention that tax morale enhanced tax compliance and the quality of governance had an observable impact on compliance. Alm and Torgler (2011) suggested rather comprehensive government measures toward tax compliance comprising “detection and punishment” as “a reasonable starting point” and also a “much broader range of actual motivations including ethics,” emphasizing that individuals were not always influenced by selfish economic interest as neoclassical theory suggested but were also affected by notions of “fairness, altruism, reciprocity, trust, social norms and more broadly ethics.” Alm and McClellan (2012) showed that firms with higher tax morale evaded less than firms with lower morale as individuals did. Bobek,

Hageman and Kelliher (2013) showed that “individuals’ standards for behavior/ethical beliefs (personal norms) as well as the expectations of close others (subjective norms) directly influence tax compliance decisions” and that “other individuals’ actual behaviors (descriptive norms) have an indirect influence.”

As discussed above, it is uncertain whether, even broadly, the institutional and legislative approach advocating the manipulation of economic factors for enhanced compliance or the normative and cognitive approach founded on non-economic factors is effective on its own. Therefore, apart from arguments that have been put forth to date, further research will need to be undertaken to help determine whether two approaches could complement each other in improving the effectiveness of taxation.

Despite the myriad research on both the institutional and legislative approach and the normative and cognitive approach, there are not many literatures that fuse to surpass the dichotomy of both approaches. That is because the two approaches are quite divergent and hard to be integrated as a whole. However, it is in the interest of tax policy makers and administrators to find a holistic approach to provide for effective and swift tax reform. A normative and cognitive approach seems elusive, despite its effectiveness, for tax policy makers and administrators to implement, while an institutional and legislative approach is more distinct and clearer in terms of implementation. Therefore, any approaches that induce not only institutional changes, but also normative changes would be welcomed by tax policy makers and administrators. One such approach may be to “digitize” tax administration that augments tax authorities’ institutional capability and promotes taxpayers’ cognitive and behavioral changes. Electronic tax administration would provide tax authorities with powerful tools that are capable of integrating tax information provided by taxpayers (or third parties) and simultaneously reducing tax compliance costs with efficient, transparent, and trustworthy services that ultimately enhance tax ethics and trust in tax administration.

Although electronic tax administration such as electronic registration, e-filing, and e-invoice is increasingly adopted in many countries, research on its effect has been surprisingly limited. Ainsworth (2006, pp. 929-930) suggested a “digital VAT” as an efficient national consumption tax for the United States to contemplate, stressing that “in terms of the critical accuracy of the automated processes, the D(igital)-VAT relies on the inherent “self-checking” attribute of a credit-invoice VAT. (...) D-VAT’s automation of the invoice flows will allow this self-checking function to be measured, assured, and verified.” Yilmaz and Coolidge (2013) analyzed the effect of e-filing on tax compliance costs in developing countries and showed that if policy implementation of e-filing were improperly managed (e.g., requiring taxpayers to report both e-filing and paper filing), the tax compliance cost might raise the total compliance costs. Bird and Oldman (2000) demonstrated in a Singaporean case study that Singapore successfully introduced integrated computerized tax administration not by simply introducing new technology to tax administration but

by completely reengineering tax administration, improving taxpayer service, and facilitating compliance. PricewaterhouseCoopers (2010) presented mandatory e-invoicing as one of the alternative VAT collection methods to the European Commission indicating that under this model “tax authorities gain access to information on sales transactions at a very early stage, i.e. at the time the invoice is issued.”

3. Study Objectives and Scope

This paper presumes Korea’s success with electronic tax invoice and the accompanying early warning system—one of the most effective electronic tax administration tools in Korea—as a holistic approach that harmonizes the institutional and legislative approach and the normative and cognitive approach in effectively raising tax compliance.

The introduction of ETI is a *prima facie* institutional and legislative approach. However, ETI not only launches a new institutional reform, but also enhance taxpayer service and trust by facilitating taxpayer compliance. ETI gives a tax authority an instant access to transaction data just as an invoice is issued (PricewaterhouseCoopers, 2010), generating a more powerful effect on tax compliance than paper-based invoice. The instant access to and processing of digital information by tax authorities increase taxpayer’s vigilance on an audit possibility and hence reduce noncompliance in VAT filings and input tax refund claims. ETI also contributes to reducing taxpayer costs that are incurred in selling and purchasing, invoicing, making payments and settlements, and filing VAT with increased transaction efficiency and accuracy. Tax authorities can also lower substantial cost and time related to VAT filings and refund claims while improving taxpayer service by reallocating the savings to the more valuable core service areas. Such changes would eventually contribute to VAT compliance. Therefore, this paper reviews Korea’s ETI under the broad assumption that ETI enhances tax compliance through both institutional and normative changes. Although this paper does not conduct quantitative causal analyses to examine the effects of ETI on tax compliance, it provides a descriptive analysis by utilizing various sources including studies, materials, and information regarding Korea’s ETI introduction, statistical data provided by the National Tax Service (NTS), and the results of a perception survey on ETI conducted by the author for this paper.

This paper describes Korea’s motivation for ETI, the implementation process, the legal and regulatory regimes, the key issues associated with the introduction, the accomplishments and lessons learned, and future challenges for tax policy makers and tax authorities in developing countries that are contemplating ETI. Chapter 2 presents an overview of ETI including its concept, the process of e-invoicing, and the experience of various countries with e-invoicing. Chapter 3 then reviews the “drivers” of ETI in Korea and the implementation process and challenges. Chapter 4 evaluates the effects of ETI on compliance cost reduction and combating tax fraud

and evasion by utilizing data obtained from the NTS. In addition, this paper presents findings on tax compliance from a perception survey of taxpayers and tax practitioners such as CPAs, tax accountants, attorneys, and tax specialists in corporate or individual businesses. Lastly, some concluding insights and reflections are presented for tax authorities contemplating ETI with the benefit of hindsight from Korea's ETI experience.

II. ETI EXPERIENCES ACROSS COUNTRIES

1. What Is ETI?

An invoice is a commercial document that a business issues to a customer with the agreed price, quantity, taxes paid or owed, and other information pertaining to a transaction. It constitutes mutual recognition of the occurrence of a 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 upon a sale. Businesses have an incentive to obtain an invoice for each purchase from their suppliers because they can claim the input tax credits available to them. 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 or ETI is an electronically produced invoice containing transaction information much like a paper invoice that businesses issue to their customers. ETIs are widely used nowadays, but their methods and formats vary from country to country. In recent years, the EU has relaxed its stance on “e-invoice” formats in order to reduce barriers to the use and acceptance of e-invoicing, while some non-EU countries such as Chile, Korea, Mexico, and Taiwan, China, have opted for standardized formats such as structured formats using extensible markup language (XML).

The EU VAT Directive defines electronic invoice as “an invoice that contains the information required in this Directive,⁴ and which has been issued and received in any electronic format.”⁵ The phrase “any electronic format” includes any electronic means capable of ensuring the authenticity and integrity of the invoice, which may be achieved by any business controls that enable “a reliable audit trail between an

⁴ The directive requires in the invoice the date of issue, the sequential invoice number, the VAT identification number for the business and customer, the quantity (or the extent) and nature of goods and services transacted, the date of supply or the date of payment, the taxable amount per rate or exemption, the unit price net of VAT and any discounts or rebate, the VAT rate applied, the VAT amount payable, references to provisions indicating an exemption, any reverse charge or margin scheme, and other similar information.

⁵ Article 217, EU VAT Directive 2006/112/EC;

invoice and the supply of the goods or services.”⁶ What should be noted here is that the EU VAT Directive does not expressly require taxpayers to electronically transfer ETI information to the tax authority. The invoice is merely issued electronically to a customer and retained electronically by the issuer together with information verifying the authenticity and integrity of the invoices.⁷

Korea regulates ETI more strictly than the EU. While Korea’s VAT rules and regulations do not provide any specific definition of ETI, they do specify key requirements⁸ that an ETI must meet: (i) it must provide a set of information including 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 of supply, , 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 personal authentication program that verifies the issuer’s identity and attests to the non-alteration of the invoice; (iii) it must be issued using electronic channels that are designated by the Presidential Decree of the VAT Law; and (iv) it must be transmitted to the National Tax Service (NTS) within a day from the day of the issuance.

The “electronic channels” designated by the Presidential Decree of the VAT Law include: (i) the taxpayer’s certified enterprise resource planning (ERP) system;⁹ (ii) a certified application service provider (ASP);¹⁰ (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 receipt¹¹ or credit cards. Accordingly, only an electronic format with digital signature that has been certified by a licensed certification authority may be used for transmission through an electronic channel that has acquired the standard certification to issue a valid ETI. In addition, the law requires ETI information to be transmitted to NTS electronically.

2. ETI Process

The process of issuing an ETI varies from country to country depending on the invoicing practice and ETI regulations. Some countries have instituted procedures to pre-approve ETIs eligible for issuance or transmit ETI information to the tax

⁶ Article 232, EU VAT Directive 2006/112/EC;

⁷ Article 247(2), EU VAT Directive 2006/112/EC;

⁸ Article 16 of the *VAT Law* and article 68 of the *Presidential Decree of the VAT Law*, Korea;

⁹ ERPs that have acquired standard certification in accordance with the Framework Act on Electronic Commerce (FAEC);

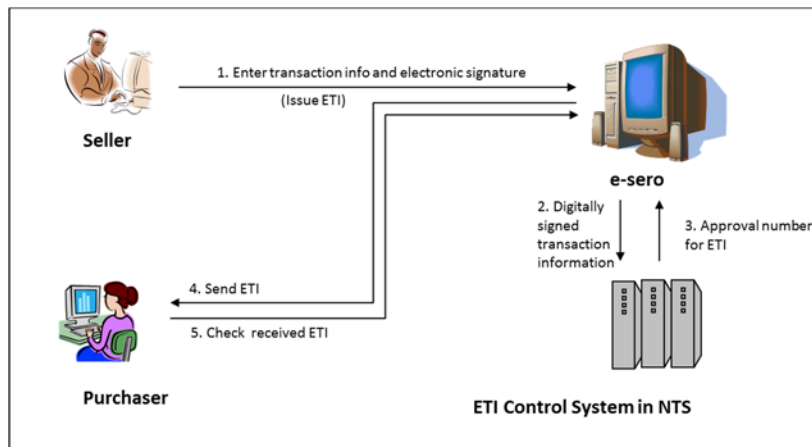
¹⁰ ASPs that have acquired standard certification in accordance with the FAEC;

¹¹ It was introduced in January 2005 to enhance the transparency of cash transactions in Korea; when a customer presents an ID, a cash receipt card, or a mobile phone number and pays cash for goods or services purchased, the business supplier issue a “cash receipt” through the cash receipt terminal and transmits the transaction information to the NTS at the point of sales.

authority, while others require no such pre-authorization or information transmission.

In Korea, a trader connects to the electronic information system through an ERP, an 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 email account. The ETI information must also be forwarded to the NTS by the end of the following day. A trader who opts for 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 that are transmitted to the NTS via the approved channels are therefore centrally processed by the NTS's ETI system, enabling the NTS to access transaction-level information in real time. The following diagrams explain the sequence of e-invoicing either through ERP (ASP) or the *e-sero* in Korea.

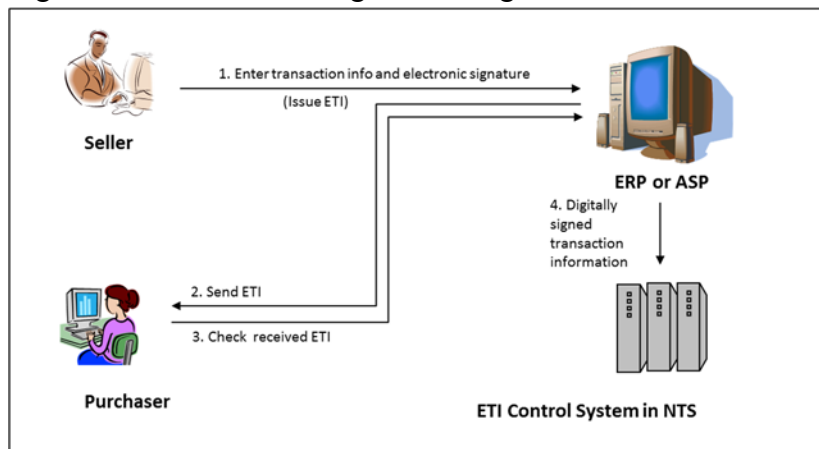
Figure 1: Process of Issuing ETI through ERP or ASP



Source: Lee, 2011;

Note: The author modified and translated from Korean.

Figure 2: Process of Issuing ETI through E-sero

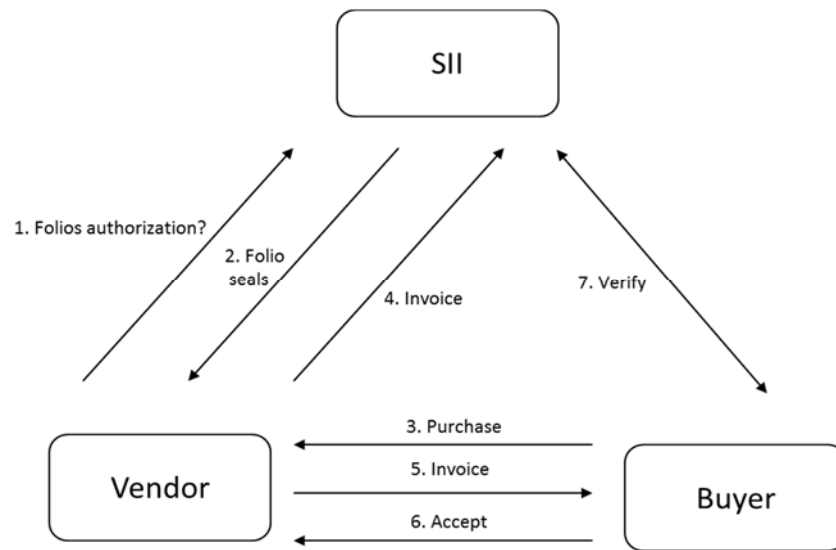


Source: Lee, 2011;

Note: The author modified and translated from Korean.

Among the various VAT regimes adopted by many countries, Chile's e-invoicing process stands out because it provides for prior-approval of e-invoice from the Servicio de Impuestos Internos (SII), the country's tax authority. Chile maintains its conventional invoicing practice in e-invoicing as the SII authorizes eligible invoices prior to their use. The main difference is that it is conducted electronically. E-invoices are generated through an electronic process in the format and procedure that are defined by the Chilean tax authority with digital signature also added to the invoice to ensure the integrity, authenticity, and acceptance of e-invoices (Barraza, 2006). The process of e-invoicing is shown in Figure 3 (Barros & Madelaine, 2004). In step 1, a trader requests an authorization stamp to SII, and in step 2 the SII stamps its seal. In step 3, a buyer purchases a good or a service, and in step 4 the trader generates an invoice and sends it to the SII. Then, in step 5, the trader sends it to the buyer, and in step 6 the buyer accepts the invoice. In step 7, the SII verifies the invoice. Each month, the trader uploads a monthly summary of electronic documents to the designated SII website.

Figure 3: Electronic Invoice Issuance Process in Chile



Source: Barros & Madelaine, 2004;

3. ETI across Countries

EU Countries

The EU Directive 1999/93/EC set the regulatory framework for electronic signature in 1999 that laid the groundwork for e-invoicing.¹² It defined advanced electronic signature as an electronic signature with several important attributes. According to the directive, advanced electronic signature had to be “uniquely linked” to the signatory and capable of identifying the signatory. In addition, it had to be created using means that the signatory can maintain under his or her control and “linked to the data to which it relates in such a manner that any subsequent change of the data is detectable.”¹³ Importantly, the 1999 directive conferred upon the advanced electronic signature the same legal effects as hand-written signature and admissibility as evidence in legal proceedings.¹⁴

In December 2001, Directive 2001/115/EC that established new e-invoicing rules was adopted.¹⁵ Under the new directive, which took effect on January 1, 2004, an invoice could be electronically delivered in a specified format subject to an acceptance by the customer. An advanced electronic signature within the meaning of

¹² Directive 1999/93/EC of the European Parliament and of the Council of 13 December 1999 on a Community framework for electronic signatures;

¹³ Article 2(2), Directive 1999/93/EC;

¹⁴ Article 5(1), Directive 1999/93/EC;

¹⁵ Council Directive 2001/115/EC of 20 December 2001 amending Directive 77/388/ECC with a view to simplifying, modernizing and harmonizing the conditions laid down for invoicing in respect of value added tax;

Directive 1999/93/EC, or by an electronic data interchange (EDI), or other electronic means subject to acceptance by the EU Member States was intended to ensure the authenticity of the origin and the integrity of the content.¹⁶

In July 2010, Directive 2010/45/EU, which amended Directive 2006/112/EC and became effective on January 1, 2013, revised the requirements on electronic invoicing in order to alleviate compliance cost and remove barriers.¹⁷ The preface of the 2010 directive provided for equal treatment of paper and electronic invoices and stated that the tax authorities' "control competences and the rights and obligations of taxable persons should apply equally" between paper and electronic invoices. The 2010 directive thus made it clear that the authenticity of an invoice's origin, the integrity of its content, and its legibility must be assured irrespective of whether the invoice was in a paper form or in an electronic form from the point in time of issue until the end of the period for storage of invoice." It also gave taxpayers options to "determine the way to ensure the authenticity of the origin, the integrity of the content and the legibility of the invoice." It allowed "any business controls which create a reliable audit trail between an invoice and a supply of goods or services." For electronic invoice, the 2010 directive cited advanced electronic signature and EDI only as examples of the available technologies, not as a required format as did the previous directive in order to ensure the authenticity of an invoice's origin and the integrity of its content. In short, the 2010 directive gave taxpayers the freedom to decide the most effective method of ensuring the authenticity of an invoice's origin, the integrity of its content, and its legibility. In fact, the only requirement for an e-invoice was the buyer's acceptance.

Although the EU seemed to encourage a more flexible regime by allowing the use of "any business controls" that create a reliable audit trail between an invoice and the supply of goods and services, this was not necessarily the case for each of the EU member states because considerable differences and nuances in e-invoice regulations emerged in the implementation process (Schmandt & Engel-Flechsigt, 2013). That is, some countries adopted more liberal e-invoice rules listing electronic formats other than advanced electronic signatures and EDIs, while others opted for more structured electronic formats.

In addition, Directive 2010/45/EU defined "electronic invoice" as "an invoice that contains the information required in this Directive, and which has been issued and received in any electronic format."¹⁸ It also newly defined "authenticity of the origin" as "the assurance of the identity of the supplier or the issuer of the invoice" and "integrity of the content" as "the content required according to this Directive has not been altered."

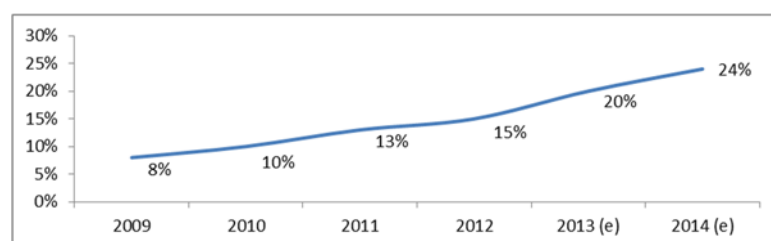
¹⁶ Article 2(2)(c), Directive 2001/115/EC;

¹⁷ Directive 2010/45/EU of 13 July 2010 amending Directive 2006/112/EC on the common system of value added tax as regards the rules on invoicing;

¹⁸ Article 1(11), Directive 2010/45/EU;

As of 2009, approximately 5 percent of the 30 billion invoices—including those in B2B, B2G, and B2C transactions—that were issued in Europe were issued electronically (Mai, 2010). Koch-Billentis (May 2014, p. 32) estimated that the share of e-invoicing among the 17 billion invoices received by businesses and governments in Europe would grow to 24 percent by 2014 from 8 percent in 2008 (as projected in Figure 4 below). However, Koch-Billentis also noted that the increase in e-invoicing from 2013 merely indicated statistical effects since the EU included PDF files attached to emails as valid e-invoices as of the effective date of Directive 2010/45/EU. Therefore, if the PDF files were excluded from e-invoicing as they were not fully developed e-invoices (because of the difficulty with electronically integrating other operational IT systems), the more structured e-invoices such as XML and EDIs accounted for approximately 7 to 8 percent in 2014.¹⁹ According to the Eurostat, close to 30 percent of enterprises with at least 10 employees in the 28 EU member states transmitted and received e-invoices in 2010.²⁰

Figure 4: Share of E-invoicing in B2B, B2G, and G2B in Europe



Austria

Austria's law allows two additional methods of ensuring the authenticity and integrity of an invoice other than an advanced electronic signature or an EDI. One is an in-house control method, by which a reliable audit trail between an invoice and the delivery of a service is provided. The other is through the Business Service Portal or the Pan-European Public Procurement OnLine (Schmandt & Engel-Flechsigg, 2013). Austria does not permit PDF document as a valid e-invoice and mandate business suppliers to send e-invoice in the format of XML (Koch-Billentis, May 2014, p. 35). According to the Eurostat, 18 percent of enterprises with at least 10 employees in Austria sent or received e-invoices in 2010.²¹

¹⁹ The calculation is derived by the author from Koch-Balanitis's estimation (2014, p. 35) that unstructured PDF documents or pure image files account for approximately 70% of e-invoicing.

²⁰ <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tin00114>;

²¹ Ibid.

Denmark

Denmark is one of the countries with a strong government initiative for electronic invoice. It has made electronic invoice compulsory in B2G since February 2005 so that all public-sector institutions in the country accept only e-invoices from business suppliers. Small vendors without the capacity to issue e-invoice can send paper invoices to the “read-in bureau,” which transforms paper invoices into electronic invoices and transfers them to public institutions without charging a service fee. Business suppliers can also use private invoice portals that provide invoicing service or use their own accounting or invoicing system to transmit invoices directly to the public institutions (Agency for Modernisation Ministry of Finance). Approximately 15 million transactions are now invoiced electronically, giving the government and the public sector savings of € 100 million in three years (Gartner, 2009). According to the Eurostat, 39 percent of enterprises with at least 10 employees in Denmark sent or received e-invoices in 2010.²²

France

Three methods of ensuring the authenticity and integrity of e-invoices are allowed. The first is any technical solutions establishing a reliable audit trail between the invoice issued or received and the underlying goods or services, and the second a procedure defined as an advanced electronic signature. The third is a form of a structured message in a standard agreed between the parties (Schmandt & Engel-Flehsig, 2013). According to the Eurostat, 36 percent of enterprises with at least 10 employees in France sent or received e-invoices in 2010.²³

Germany

All transmission methods including an e-mail, a PDF file, a text file, a computerized facsimile, and a facsimile server have been allowed as a valid e-invoice format subject to the authenticity of the origin and the integrity of the invoice contents since new rules on e-invoice took effect on July 1, 2011, in compliance with the EU VAT Directive (KPMG, Germany: VAT essentials). A reliable audit trail ensuring a link between an invoice and the underlying performance may also be established through a manual matching between the invoice and business documents presenting activities such as an order, a payment, or a delivery of goods and services (Schmandt & Engel-Flehsig, 2013). According to the Eurostat, 36 percent of enterprises with at least 10 employees in Germany sent or received e-invoices in 2010.²⁴

United Kingdom

²² Ibid.

²³ Ibid.

²⁴ Ibid.

The United Kingdom adopted a flexible e-invoice system in accordance with the EU Directive on e-invoicing. According to the UK's VAT Notice on electronic invoicing, e-invoices can be issued where invoice authenticity and integrity is ensured through such means as an advanced electronic signature, an EDI, or business controls enabling a reliable audit trail between an invoice and the supply of goods or services.²⁵ Therefore, businesses can use such systems as "security of networks/communication links," "access controls," and "message transfer protocols" to the extent that the taxpayer can secure the authenticity and integrity of invoice data. In addition, a wide range of electronic message formats including a structured XML format, an unstructured PDF format, and traditional EDI standards are allowed as a valid e-invoice. In 2012, 55 percent of invoices in the UK were in PDF format, a relatively easy approach to e-invoicing (Institute of Financial Operations, 2012, p. 8). Taxpayers may also choose to outsource electronic invoice to a third party but they continue to assume the legal responsibilities and liabilities for the contents, storage, and production of the invoices. According to the Eurostat, 11 percent of enterprises with at least 10 employees in the UK sent or received e-invoices in 2010.²⁶

Non-EU Countries

Chile

Under a strict invoice control system that Chile had maintained since 1954, invoices had to be stamped by the Chilean tax authority prior to use as they functioned as a proof of transaction and evidence for claiming input VAT credit to tax authority. Such strict rules made Chile pioneer e-invoicing in Latin America in 2003 that enabled the tax authority to seal invoices electronically and significantly accelerate invoice processing. The introduction of e-invoice in Chile removed the limitations of the traditional invoice administration and greatly simplified tax procedures (Piaggese, Sund, & Castelnovo, 2011, p. 385). In 2005, the Chilean tax authority launched e-invoice portal, through which 200,000 small businesses could electronically issue and receive invoices (Toro, 2005). In September 2013, the tax authority announced that electronic invoice would become mandatory for large enterprises earning more than 100,000 (UF) annually effective from November 2014 and that it expected all companies to make the transition to the new system by 2018.

Mexico

Since 2011, Mexico has made it compulsory for companies with an annual income of MXN4 million (approximately USD320,000) to issue e-invoice. Beginning on January 1, 2014, the e-invoice requirement covered entities with annual receipts of MXN250,000 (approximately USD20,000). The primary objective of the mandatory

²⁵ VAT Notice 700/63: Electronic Invoicing;

²⁶ <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tin00114>;

e-invoicing was to combat tax fraud and reduce the informal economy, to which the Mexico Tax Authority (SAT) was said to have lost USD3.4 billion between 2007 and 2009 (The Economist, 2014). In order to issue an e-invoice, businesses must first register with the SAT and obtain an electronic signature and a certificate of digital stamp from SAT. In addition, only an XML format is valid for an e-invoice (KPMG, 2013).

Singapore

Singapore has allowed e-invoice since 2003. Businesses can issue an electronic invoice without prior approval from the Inland Revenue Authority of Singapore (IRAS) but must comply with the Record Keeping Guide for GST-Registered Businesses” (IRAS, 2014). Businesses may also outsource e-invoice and e-credit notes to a third party. According to the recordkeeping guide, invoice records may be kept electronically using an accounting software such as the Microsoft office programs, an off-the-shelf accounting software, and customized accounting software (IRAS, 2013). In addition, the computer output and records must operate with the necessary reliability and authenticity, although the IRAS does not require digital signatures (IRAS, 2013b). Beginning in November 2008, businesses that supply goods and services to the government are required to issue electronic invoices.

Taiwan, China

Taiwan, China’s e-invoice initiative was largely based on its traditional paper invoice practices. Taiwan, China, had adopted a “uniform invoice” system for more than 60 years with government-prescribed formats to ensure the validity of invoices for tax purposes. In 2000, Taiwan, China, introduced e-invoice that permitted businesses to transmit uniform invoice via the Internet (Chen et al, 2014). Since then, the government has been promoting e-invoice to businesses as an effective way to lessen operational cost and help protect the environment by reducing paper consumption. Taiwan, China seems to emphasize e-invoice use in B2C, where a significant portion of invoices are issued. In 2005, the Taiwanese Ministry of Finance (TMOF) promulgated regulations on issuing online shopping invoice in order to facilitate the blooming B2C e-commerce (Chen et al, 2014). Many additional measures have also been taken to encourage consumers to receive e-invoice in B2C transactions with incentives such as an e-invoice lottery giving e-invoice receivers a chance to win prizes every other month. A barcode system enabling consumers to get easily identified and receive e-invoices was also instituted (Taiwan Today, 2012). In 2011, the government made it mandatory for all businesses issuing e-invoice to use the e-invoice platform established by the TMOF (Chen et al, 2014), thus automatically directing all e-invoice transaction information to the TMOF data center.

III. KOREA'S ETI INTRODUCTION

1. Key Drivers of ETI

Strong ICT and E-government Development

The introduction of ETI in Korea is intricately intertwined with advances in Korea's ICT and e-government. After the government started to build the National Electronic Backbone Network²⁷ in early 1980s and the High Speed Information and Communication Network²⁸ in mid 1990s, Korea emerged as one of the world's most advanced countries in ICT and e-government. According to the UN e-government survey, Korea's e-government development index ranked 13th in 2003, 6th in 2008 and 1st in 2010, 2012 and 2014 (UN, 2014, 2012, 2010, 2008, & 2003). Korea's ICT Development Index has ranked 1st since 2008 (International Telecommunication Union, 2013, 2012, & 2011). Household Internet access reached 98.1 percent in 2013.²⁹ It was the combination of strong ICT development, service enhancement through e-government, and the general population's familiarity with ICT that ultimately provided the support needed for further e-government service and set the stage for the introduction of ETIs in Korea.

Korea's Success with Electronic Tax Administration

For tax administration, the NTS established in 1997 the Tax Integration System to collect, store, and analyze tax information from taxpayers and electronically connect the regional tax offices in support of centralized and integrated tax administration. After the Ministry of Finance and Economy³⁰ proposed amendments to the Framework Act on National Taxes to pave the way for electronic tax filing in 1999, the NTS set up Home Tax Service, an integrated web portal, in 2002 to provide e-filing, e-payment, and other tax services and reduce tax compliance costs. Using Home Tax Service, taxpayers can file tax return electronically, make tax payments including VAT and the Special Consumption Tax, and receive various tax administration services including business registration certificates, tax payment certificates, and tax-related filings such as application for deferment of tax collection

²⁷ The first national ICT development project covered public administration, financial business, research and education, national defense, and security from 1983 to 1995. The aim of the project was to build a small and effective government providing better services and to develop the ICT industry.

²⁸ The national project to build information and communication highways capable of delivering multimedia data (including sound, image, and movies) at high speeds lasted from 1995 to 2005. The project was aimed at supporting the information usage of governments, public institutions, and private businesses while improving the overall efficiency of the society and the country as a whole.

²⁹ International Telecommunication Union (2014) Core indicators on access to and use of ICT by households and individuals (<http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx>);

³⁰ It was reorganized into the Ministry of Strategy and Finance in 2008.

without having to visit a tax office³¹ (the NTS, 2002). The rate of electronic tax filing through Home Tax System reached 96.9 percent for corporate income taxes, 79.8 percent for individual income taxes, and 78.6 percent for VAT in 2007 (the NTS, 2007), just before the introduction of compulsory ETI in 2008.

In addition to electronic tax administration, the Ministry of Finance and Economy and the NTS introduced a series of measures to encourage electronically traceable payments such as credit cards and check (debit) cards, thereby helping to broaden the tax base in B2C transactions, which are prone to falling into the informal economy. Tax incentives were given from 1999 to wage earners for using electronically traceable payment methods, which encouraged them to demand businesses to accept traceable payments. The basic incentive structure was to allow a predetermined fraction of purchases³² made using credit or check cards as deduction from taxable wage income when they filed income tax returns. In 2005, cash payments under certain conditions were included as an electronically traceable payment. This worked by a consumer paying cash for goods and services and asking the merchant to issue electronic cash receipts through their payment terminals and transmit the transaction data to the NTS. An incentive that was similar to that given for credit card purchases was also given to this electronically traceable cash payment.

The use of electronically traceable payments in B2C transactions has been very successful in broadening the tax base. The number of transactions using credit cards soared 57.6 percent annually from 1998 to 2003.³³ In value terms, credit card usage increased at an annual rate of 47.7 percent during the same period.³⁴ As a result, since 2005, the total amount of credit card transactions relative to the GDP has exceeded 30 percent, the highest among the 23 member countries of the Committee on Payment and Settlement Systems, Bank for International Settlements.³⁵ Song and Sung (2012) estimated that the introduction of tax credit for electronically traceable payment methods increased tax revenues by KRW880 billion in 2009: an increase of KRW2.3 trillion in broader tax base but a decrease of KRW1.4 trillion in tax revenue forgone for tax credits. Because of the success in encouraging electronic payments in B2C, the electronic tax invoice became an obvious candidate for B2B, an effective

³¹ Taxpayers now can file 12 tax returns and pay taxes including VAT and individual and corporate income taxes, obtain 23 different types of certificates, and file more than 100 tax-related applications through Home Tax Service (<http://www.hometax.go.kr>).

³² When the incentive was introduced in 1999, 10 percent of the credit or check card purchases in value term (not exceeding KRW3 million) above 10 percent of the total wage income were eligible for income deduction. As of 2013, 15 percent of the credit card purchases exceeding 25 percent of the total wage income were eligible for income deduction.

³³ The Bank of Korea (2013) Statistics on payment, clearing and settlement in Korea (in Korean);

³⁴ Ibid.

³⁵ Card payments (except e-money) relative to the GDP came to 30.5% in 2005 and 38.5% in 2008 when the mandatory ETI was introduced in Korea. It reached 41.8% in 2013; data from the Committee on Payment and Settlement Systems, BIS (each year), *Statistics on payment, clearing and settlement systems in the CPSS countries*.

tool for tracking transaction information instantly and enhancing VAT tax compliance.

Onerous Requirements for Invoice Submission to the NTS

When Korea introduced VAT in 1977, it adopted a very rigorous invoice control system that no other countries had ever attempted (Tait, 1988, pp. 280-281). Most countries that have adopted invoice-credit VAT require taxpayers only to store invoices as proof for their VAT filing but do not require submitting them when they file VAT returns. In Korea, taxpayers must not only keep all the invoices upon purchase and sales, but also submit them to the NTS when they file VAT returns.³⁶ If a taxpayer submitted invoice summary lists or electronic tapes containing all the transaction information written in invoices, they were regarded as the submission of tax invoices.³⁷ After the NTS received paper-based invoices or transaction information, it converted the information into electronic data so that a cross-check could be performed on the purchase and sales reported. In 1994 and 1995, the obligation of invoice submission was alleviated to submission of aggregate summary lists of invoices containing transaction information.³⁸ If taxpayers submitted electronic tapes or diskettes containing all the information in aggregate summary lists of invoices, it was deemed to submit aggregate summary lists of invoices.³⁹ The NTS still computerizes these invoice information and produces discrepancy data between taxpayers' purchase and sales and identifies suspicious input tax credit claims⁴⁰ (the NTS, March 2013). Despite the continuous efforts to lessen invoice related burden, Korea's unique invoice control system inevitably led to increase in taxpayers compliance costs. According to a research on tax compliance costs in Korea, costs related to tax invoice accounted for 50.6 percent of the total VAT compliance cost of corporate businesses and 67.6 percent in case of individual businesses (Kim & Park, 2007, p. 134). Korea Institute of Public Finance recommended that submission of aggregate summary lists of invoices be repealed (1996, pp. 171-172).

In such a context, the tax authority in Korea should have alleviated taxpayers' burden regarding submission of tax invoice information. However, they could not simply abandon their year-long practice to cross check invoices between business suppliers and customers. Therefore, Korea chose ETI as an alternative that could both extend such a rigorous invoice control system evolved since 1977 and lessen taxpayers' burden to submit aggregate summary lists of invoices, taking advantage of state-of-the-art IC technology. At the same time, ETIs were expected to lessen the NTS' substantial burden of computerizing invoice information submitted by taxpayers.

³⁶ Article 20 of the *VAT Law* (effective July 1, 1977);

³⁷ Article 66 of the *Presidential Decree of the VAT Law* (effective July 1, 1977);

³⁸ Article 20 of the *VAT Law* (effective January 1, 1994, and January 1, 1995);

³⁹ Article 66 of the *Presidential Decree of the VAT Law* (effective January 1, 1995);

⁴⁰ Articles 68 and 70 of the *Guideline of VAT administration*, the National Tax Service (March 2013);

Combating Invoice Seller Fraud

In addition, serious tax frauds so called “invoice sellers”⁴¹ who established a bogus company and issued fictitious invoices to sell to businesses have not disappeared but widespread since 2000 as shown in Table 1. Since 2003, the NTS had reinforced tax investigation against invoice seller frauds through its Dedicated Cross-regional-tracking Investigation Team under the annual invoice sellers investigation plan (the NTS, 2003 & 2004). Cases of invoice seller frauds peaked in 2005 and started to decrease gradually, but they were unacceptably high in 2007 before the compulsory ETI was introduced the following year.

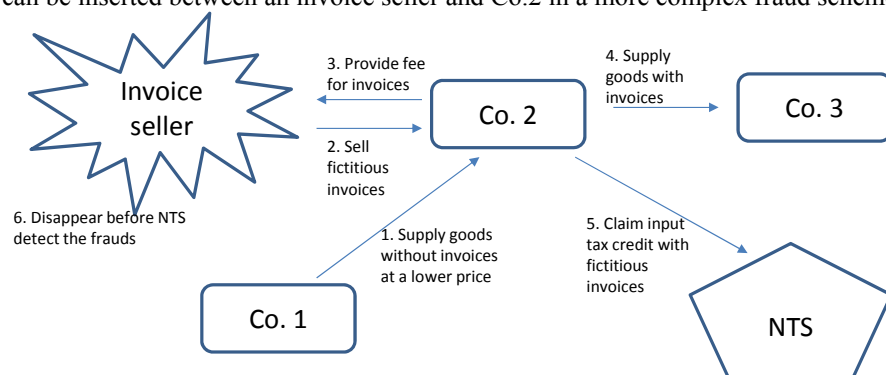
Table 1: Number of Invoice Seller Charges

	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

Note: Data compiled by the author from the NTS press release (the NTS, 2003) and a document submitted to the National Assembly by the NTS (the NTS, December, 2008)

As noted above, the NTS computerized transaction information and cross-checked sales and purchase of taxpayers to identify any suspicious transaction even before the introduction of the mandatory ETI. But it took more than one and a half year after the tax return to identify suspicious transactions. Therefore, the old system of cross-checking taxpayers’ tax return by computerizing the summary lists of invoices was no longer effective against invoice sellers who typically sold a large amount of invoices in a very short period of time and disappeared. In contrast, ETIs were seen as a powerful tool to digitalize each transaction carried out among taxpayers in real time and cross-check transactions between sellers and purchasers even before the VAT return. It computerizes not simply the aggregate result of transactions and taxable amount as in e-filing but also all the evidences of the e-filing, which will

⁴¹ A basic “invoice seller” fraud is shown in the following diagram. One or more buffer companies can be inserted between an invoice seller and Co.2 in a more complex fraud scheme.



enable the NTS to gain access to all the transaction information in real-time and to check whether any transactions are fictitious or not. ETIs had potential to enable “D(igital)-VAT,” as Ainsworth suggested (2006, pp. 929-930), that could fully utilize the inherent “self-checking” attribute of a credit-invoice VAT.

Therefore, when an invoice seller issued a large number of invoices but received very little invoices, then such unbalance would be detected by the NTS in real time. So, it was believed that ETIs would lessen frauds committed by invoice sellers and enhance the transparency of business transactions. In addition, ETI was also a completion of digitalizing VAT administration together with e-registration⁴² and e-filing,⁴³ which had been already adopted before the adoption of compulsory ETI in Korea.

2. Introduction of ETI in Korea

Korea first introduced ETI in 1997 as an alternative to paper-based tax invoice to recognize electronic file or electronic data storage as a legally effective instrument. The then-Presidential Decree of the VAT Law⁴⁴ that had provided for ETI 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 the early introduction, Korea’s ETI lacked two critical prerequisites: the authenticity of origin and the integrity of content (“authenticity and integrity”). Because of the ease with which electronic files can be altered, there should have been regulations on identifying an invoice issuer and verifying the integrity of content after signature. The initial absence of the two prerequisites was due to the fact that rules and regulations necessary for electronic identification and data integrity were not in place in the relevant laws. It was not until 1999 when the Framework Act on Electronic Commerce was enacted and granted electronic documents the same legal effects as those given to paper documents. The Framework Act on Electronic Commerce also recognized digital signature certified by a licensed certification authority as a legally binding signature and treated an electronic document bearing a digital signature as an unaltered document. Electronic documents were also granted admissibility as evidence in court proceedings. The same year the Digital Signature Act was enacted with provisions defining digital signature as “information that is unique to an electronic message, created by a private key using an asymmetric cryptosystem such that the identity of the person

⁴² The NTS introduced business registration through the Internet on December 1, 2010. Any corporate or individual businesses can apply for business registration and print registration certificates through the Internet.

⁴³ The NTS introduced e-filing through the Internet in 2002. The percentage of e-filing reached 78.6% in 2007 (the NTS, October 2007).

⁴⁴ Paragraph 4 of article 53 of the *Presidential Decree of the VAT Law* (effective January 1, 1997);

generating the electronic message and any possible alteration thereof can be verified.” The Digital Signature Act also provided for certification authorities that are licensed to issue digital signature certification and maintain certification records.

In 2001, more detailed tax regulations on ETI reflecting legislative changes on electronic documents and digital signatures took effect.⁴⁵ The new regulations required ETIs to be transmitted either through the Internet via a certification system to ensure the authenticity and integrity of ETIs 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 (ASPs) were also introduced to provide invoice services for enterprises lacking the capacity to issue ETIs on their own. Guidelines on issuing and storing ETIs and information required for ETIs were also released to supplement the new regulations.

With the legal and regulatory frameworks in place, one unresolved issue was ensuring the compatibility of electronic documents and digital signature formats. This was critical to the pace of ETI adoption because it would be difficult for sellers and buyers to agree on issuing and accepting ETIs if they insisted on incompatible electronic systems that generated incompatible document formats. In 2001, discussions on ETI standardization among private-sector expert groups were started in order to bring compatibility to more than 200 ETI formats and digital signature authentications that were in use at the time (Ministry of Industry and Energy, 2005).

In February 2004, the Korea Electronic Data Interchange for Administration, Commerce, and Transport Committee (“KEC”) endorsed XML-based ETI (“Standard ETI”) that had been established by a private ETI Discussion Group following consultations with stakeholders that included software solution developers, ETI software user companies, and the relevant public institutions. However, when the Korea Institute for Electronic Commerce, an implementation body under the KEC, announced its plan to certify ETIs that meet the standard criteria with the goal of accelerating ETI standardization, ETI solution providers and ETI service companies opposed the move fearing a loss of their market share to new certification competitors.⁴⁶ Businesses using ETIs, however, supported the move as it would promote ETI compatibility and accelerate ETI standardization.⁴⁷ After consultations with businesses and ETI service providers, the Korea Institute for Electronic Commerce managed to bring the interested parties into an agreement on ETI certification in October the same year. Two month later in December, KEC revised the Standard ETI to incorporate the October agreement. 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.

⁴⁵ Paragraphs 4, 5, and 6 of article 53 of *the Presidential Decree of the VAT Law* (effective January 1, 2001);

⁴⁶ Electronic News (May 28, 2004);

⁴⁷ Electronic News (June 25, 2004);

Despite the regulatory overhaul and fine-tuning of ETI standardization and certification, ETI adoption was sluggish and embraced only by a small number of enterprises (Park & Yi, 2011). In fact, according to a survey conducted in 2002, only 1.4 percent of businesses had issued ETIs, and only 10.5 percent issued both ETIs and paper invoices (as cited in Oh, 2002, p. 185). In 2008, eleven years after the introduction of optional ETI and four years after the standardization of ETIs, the use of ETIs still lingered around 15 percent of the total invoices.⁴⁸

In response to the slower-than-expected pace of ETI adoption, the Ministry of Strategy and Finance proposed changes to the VAT Law instituting compulsory ETI with one-year grace period at the end of 2008. At the time, the Ministry of Strategy and Finance made it clear that compulsory ETI was intended “to alleviate taxpayers’ compliance costs” and “to enhance the transparency of business transactions” (Korea, Ministry of Strategy and Finance, September 2008). Under the draft proposal, all corporate businesses and designated individual businesses that were required to maintain double-entry bookkeeping were to resort to ETI and transmit transaction information to the NTS beginning in 2010. Fines equivalent to one percent of sales whose ETI information was not transmitted were also to be levied. The draft amendments were approved and passed by the National Assembly at the end of 2008 with the exclusion of individual businesses so that only corporate businesses would be required to comply with the compulsory ETI beginning in 2010 (National Assembly, 2008).

Even before the compulsory ETI took effect, however, the NTS together with other agencies and public entities was stepping up preparation for it. The Korea Institute for Electronic Commerce drafted the revised Standard ETI (V3.0) in collaboration with the NTS and private-sector ETI service providers in order to incorporate changes brought about the compulsory use of ETI, and the KEC endorsed the revised Standard ETI (V3.0) in March 2009. In November 2009, the NTS also 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 Agency⁴⁹ started to certify standard ETIs for large companies that issued ETIs through their own IT systems and for application service providers that offered ETI services to business enterprises. Preparations for compulsory ETIs were completed by the end of 2009.

At the same time, the Ministry of Strategy and Finance put forth new amendments to the VAT Law giving one additional year of grace period to small companies for ETI

⁴⁸ Unchan Pak, Director General of Property and Consumption Tax Bureau, Ministry of Strategy and Finance, mentioned in Strategy and Finance Subcommittee of the National Assembly in 2008 “ETI was introduced in 1997. Approximately 15% of the total invoices (80 million invoices) are now issued in the form of ETIs” (the National Assembly, 2008, p. 49).

⁴⁹ The Korea Institute for Electronic Commerce was merged with Korea IT Industry Promotion Agency in August 2009.

preparation. As a result, corporate businesses could opt for ETIs in 2010, but they were still required to issue ETIs from 2011. In the meanwhile, the amended law imposed new ETI requirements on individual businesses whose compliance was waived during the approval process at the National Assembly in 2008. Individual businesses whose annual sales exceeded the KRW1 billion (approximately USD 910 thousand) threshold also had to issue ETIs from 2012, a year behind corporate businesses. From July 1, 2014, individual businesses whose annual sales exceed KRW300 million (approximately USD 270 thousand) were required to issue ETIs.

3. ETI Challenges and Korea's Approach

Countries gearing up for ETI in their VAT system face a number of critical issues that must be addressed. Inevitably, ETI adoption will vary from country to country depending on the objectives of the tax reform to introduce ETI, the environment, and the practices of the country's tax administration. With the benefit of the hindsight of the experiences of Korea and other countries, this section discusses issues that are of critical importance and must be effectively addressed by the government. It also presents a series of approaches taken by the Korean government to ensure effective ETI adoption.

Improving Taxpayer Service vs. Combating Tax Frauds

The motivation for e-invoice is critical in deciding the framework for the e-invoice regime. Depending on the priorities of the tax reform, two different approaches are observed in e-invoicing.

Countries putting the emphasis on improving taxpayer service and reducing tax compliance costs associated with producing, delivering, and storing invoices tend to gradually phase in e-invoice on an optional basis with a focus on eliminating hurdles. Such business-friendly approach respects the private sector's voluntary transition from paper invoicing to e-invoicing. However, it is typically more time-consuming because businesses may insist on paper invoicing to avoid their business partners' refusal of e-invoice, notwithstanding the obvious benefits obtainable when e-invoicing is fully adopted. If either business suppliers are reluctant to issue e-invoices, or customers are reluctant to accept them, their use and acceptance will be limited. In this respect, the compatibility of e-invoices between sellers and buyers is critical. It is a typical market failure, in which each market participant is aware of the superiority of ETI and its advantages but still engages in the inferior transaction practices. Korea's experience suggests that even ETI standardization aimed at improving the compatibility of ETIs and the certification of ETIs with the support and consensus from private stakeholder did not materially increase the adoption of ETIs. Government involvement may be justified in such cases.

Countries grappling with a significant informal economy or tax fraud problems have tended to embrace compulsory ETI to expand the tax base immediately. These

countries cannot afford to take the backseat merely hoping that e-invoice will somehow take hold. They expect compulsory ETI to deter unscrupulous taxpayers from falsely claiming input tax credit or misrepresenting their sales while enabling the tax authorities to gain access to transaction-level information at or near the point of sale. For them, the remedy may be a truly “digital VAT” with computerized cross-checking capability. On the other hand, excessive emphasis on combating tax frauds and reducing the informal economy may backfire. Resistance from taxpayers who are apprehensive about their tax burden may overwhelm the advantages of ETI and keep them from taking hold. Moreover, ETIs may not broaden the tax base if taxpayers get more entrenched in the informal economy and refrain from even issuing paper invoices, let alone ETIs, where noncompliance becomes rampant in the absence of effective compliance mechanisms. ETIs cannot singlehandedly turn an informal economy into a formal economy. ETIs therefore may not be the panacea that policy makers seek to cure VAT noncompliance. ETIs are a tool that helps raise the transparency of transactions and enable the tax authority to better detect tax frauds that exploit fictitious invoices, e.g., invoice sellers in Korea or MTIC frauds in the EU.

Given the divergent approaches to ETI adoption, it is essential that they supplement and complement each other. ETIs have a potential to serve two ends. First, they can benefit taxpayers in respect of their compliance cost and convenience. At the same time, they provide tax authorities with powerful tools to combat tax frauds. In addition, promoting equity in taxation by preventing tax frauds and reducing the informal economy will eventually build taxpayers’ trust on tax administration and contribute to tax compliance. Therefore, striking the right balance between these two drivers is prerequisite to successful and swift e-invoice adoption.

The Korean government started out with optional ETI in 1997 and proceeded with compulsory ETI in 2008. Throughout the process, the government made it clear that the aim of compulsory ETI was to “alleviate taxpayers’ tax compliance costs” and to “enhance the transparency of business transactions.” To achieve the twin goals, the Ministry of Strategy and Finance and the NTS took various measures to facilitate ETI issuing and alleviate taxpayers’ compliance costs not only for ETIs, but also for overall taxes. At the same time, the NTS worked to augment its capability to combat tax frauds by taking advantage of the real-time access to tax information from ETIs.

To facilitate ETI issuing, the NTS established *e-sero*, an Internet-based ETI-issuing portal, through which taxpayers can issue ETIs and retrieve information on the ETIs they issue without any service charge. Business suppliers can easily register their customer information and issue ETIs for each transaction or a batch of transactions through the website. Taxpayers can also designate the email account of their tax practitioner or application service providers in the *e-sero* system so that ETI information is automatically transferred to their service providers and thus linked to the accounting system. Information on ETI issued either through *e-sero* or an application service provider or ERP is also centralized into *e-sero* system and can be

retrieved by a taxpayer through *e-sero*, significantly alleviating the burden of having to store invoices and making it easier to file tax returns. Furthermore, a number of people can logon to *e-sero* with the same ID and the digital authentication certificate and issue ETIs simultaneously, making it possible for the employees of businesses in different places to issue ETIs anytime and anywhere through *e-sero*. For those without an access to Internet, telephone ARS similar to telephone banking is available for ETI issuance. ETIs can also be issued through electronic terminals used for credit cards, check cards, and cash receipts. The NTS not only made available a variety of ETI methods to let small businesses issue ETIs without substantial costs, but also helped them reduce the cost of tax accounting and filing tax returns by using *e-sero*. Large-scale businesses that already have their own information system such as ERP can also issue ETIs through their ERP system after acquiring the standard certification and registering their system to the NTS. Small- and medium-sized companies that issue a large volume of ETIs can outsource ETI issuing to application service providers as well.

In addition to introducing ETI in 2008, the Ministry of Strategy and Finance and the NTS have undertaken a series of measures to lighten the overall tax compliance cost. The notable measures include the release of the “Advanced Interpretation of Tax Legislation” in 2008 to help taxpayers estimate their tax liability in advance, the use of credit cards for the payment of national taxes in 2008, simplified electronic tax return filing for small- and micro-companies in 2009, recognition of electronically-converted paper documents in 2009, and “My NTS Service” providing integrated tax information search to taxpayers in 2010. Together with these measures, the NTS announced its goal of cutting tax compliance costs by 15 percent between 2011 and 2016 (the NTS, 2013).

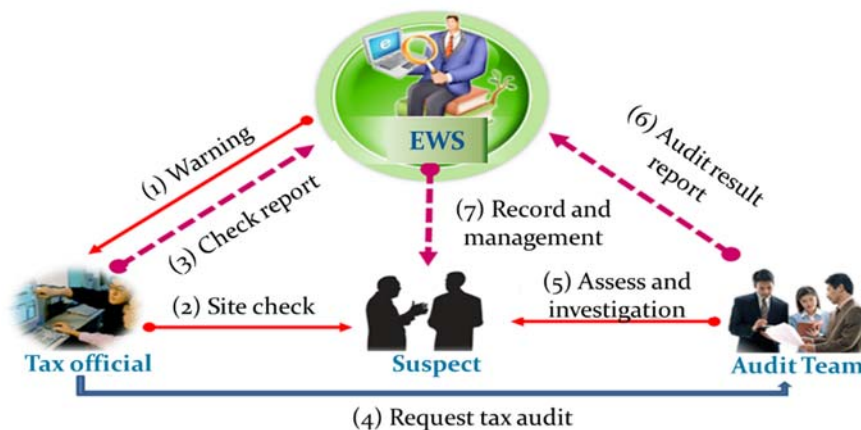
With the variety of supporting measures for taxpayers, the NTS ramped up its capability to combat tax evasions and frauds as well. The NTS launched an ETI early warning system (EWS) to combat invoice seller fraud and identify input tax credit frauds in January 2012 following the internal development from 2009 to 2011.⁵⁰ The EWS was developed through identifying fraud types, configuring analysis processes, and structuring early warning typology with series of expert and user consultations and pilot testing in 13 regional tax offices for two months. The EWS provides profiles of suspicious transactions using information from ETIs, corporate income tax filings, tax delinquency records, and other sources to help tax examiners decide on further actions. The EWS is used to not only issue early warnings for tax frauds, but also conduct risk assessment and verify VAT refund claims.

One key function of the EWS is to monitor ETI issuing in real time and produce an alarm when invoice seller fraud is identified even before VAT is filed. The EWS analyzes monthly ETI transactions and taxpayers’ filing information within 15 days

⁵⁰ The NTS developed EWS as one component of ETI systems. Development cost for EWS was approximately KRW700 million (USD630,000) for three years from 2009 to 2011.

and issues an early warning for suspicious activities within 15 days. As shown in Figure 5 below, the workflow of early warning is straightforward. First, the EWS monitors taxpayers' transactions and ETI issuing in real time and issues a warning to the regional tax officer in cases including; (i) a business issues a large number of invoices with substantial amounts and closes within a year after it started; (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 tax delinquency exists (the NTS, 2012). The regional tax officer then checks the suspicious activity with an on-site visit and reports the result of the on-site visit to the EWS. When deemed necessary, the regional tax officer requests a tax audit, and tax auditors follow up with an examination. They may then reassess tax liability or refer the matter to the government prosecution authority and report their findings and register the noncompliant taxpayer in the record system.

Figure 5: Workflow of ETI Early Warning System



Source: The National Tax Service, Korea, 2012;

Another major function of the EWS is to electronically verify early on VAT return information 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 a year and half after tax filing (even up to two and half years after transactions) to produce data discrepancy between sales and purchases and assess the correct taxes. ETIs and EWS, however, shortened this process to three months, which has proven especially effective in detecting invoice sellers who issue substantial amounts of invoices and quickly disappear.

Optional vs. Compulsory

Depending on the emphasis between the aforementioned two drivers, some countries stick to optional and more liberal e-invoicing systems, while others start with optional e-invoice and phase in compulsory ETI.

The optional ETIs respect market mechanism so that private businesses can decide whether to issue or receive e-invoices. Therefore, the burden of ETI issuers or receivers with an optional ETI is relatively lower than in a compulsory ETI. However, the adoption of ETI may be slower under the optional ETI. Issuing and receiving ETIs, as noted earlier, is an example of market failure that results from asymmetric information, in which market participants, knowing the benefits of ETI, fail to invest in ETI because of the uncertainty over whether their business partners would accept ETIs. Despite benefits such as lower invoicing costs and enhanced efficiency of business operations, not many companies take the risk of investing in ETIs as they are unable to ascertain whether their business partners will definitely invest in ETIs and commit to issuing and receiving ETIs. In such a situation, market participants will opt for paper invoices rather than ETIs, a safer choice than assuming the risk of making useless investment for ETIs. The outcome is similar to the one resulting from the so-called “prisoner’s dilemma.” All market participants know that the optimal choice is to issue ETIs, but they stick to paper invoicing. Korea’s low rate of ETI adoption before the compulsory ETI was an example of this. The compulsory ETIs, however, are not the only solution to such market failure. Even under the optional ETIs, the tax authority can support and facilitate ETI issuing by providing a clear legal framework for private businesses and legal certainty and getting rid of red tapes or excessive requirements as the EU has done since 2010. As discussed earlier, e-invoicing in the EU, which now relies on liberal ETIs, has been increasing since 2013 when new rules on e-invoicing allowed unstructured e-invoicing such as a PDF. However, structured and full-fledged XML-type e-invoicing in the EU, which enables substantial cost cutting with integration of tax, accounting, and other operation systems, remains in a relatively low range of 7 to 8 percent, pointing to a need for further action.

Countries that put more emphasis on combating tax frauds tend to opt for compulsory e-invoice and centralize e-invoice information into tax authority databases in order to better tackle tax evasions. Such compulsory enforcement would eliminate information asymmetry and resolve the problem of “prisoner’s dilemma” with a single stroke. It is notable that several EU countries including Denmark, Finland, Italy and approximately ten others adopted, or planned to adopt, a partial compulsory e-invoice only for the government and public sectors (Gartner, 2009). Although compulsory e-invoicing has the potential to accelerate the adoption of e-invoicing, it may well also increase the burden of compliance in the short run. In addition, compulsory e-invoicing can lead to taxpayer resistance when implemented too quickly. SME, micro businesses do not have the capability or cannot bear the

cost of issuing e-invoices. Even large companies need to invest in their IT system to comply with compulsory e-invoicing. Therefore, when designing a compulsory e-invoice, policy makers should give taxpayers sufficient time to be prepared and phase in gradually from large to small- and micro-businesses. Korea completed the legislation for compulsory ETI at the end of 2008 with the target of January 2010. The target date was soon extended to January 2011 to give more time for SMEs. Individual businesses whose annual sales exceeded KRW1 billion became subject to compulsory ETI from 2012 and those whose annual sales exceeded KRW300 million from July 2014. In addition to the gradual introduction of compulsory ETIs, policy makers need to review and compensate for the burden incurred especially to small- and micro-businesses.

Korea enforces compulsory ETI by levying penalties for e-invoices delayed or not transmitted to the NTS. However, the penalties were also phased in gradually ratcheting up from the lowered rate to the normal ones, considering the burden of transition to compulsory ETI. If businesses that are required to issue ETIs and transmit ETI information to the NTS by the following day delay the transmission to the NTS until the 11th day of the following month of VAT taxing period, they are subject to a penalty of 0.5 percent of the related sales. However, a reduced penalty of 0.1 percent of the related sales was applied to corporate businesses until the end of 2013 for initial transition. As for individual businesses, the 0.1 percent penalty was applied until the end of 2014. If the transmission of ETI information to the NTS is not completed by the 11th day of the following month of VAT taxing period, one percent penalty is applied. However, a lower penalty of 0.3 percent was applied to corporate businesses until the end of 2013. As for individual businesses, the 0.3 percent penalty was applied until the end of 2014. The penalty structure is shown in Table 2 as percentage of the related sales.

Table 2: Penalty for Noncompliance with ETI Information Transmission

	Application period	Delayed transmission of ETI information:	No transmission until the 11 th of the next month of VAT taxing period
		Transmission after the next day of ETI issuance until the 11 th 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

Standardization of E-invoice

Standardization of e-invoice ensures the compatibility of e-invoices that are produced by different IT systems of different users. If suppliers issue e-invoices using their own electronic format without standardization, the buyer's IT system must be equipped with document viewers that support the suppliers' formats. Furthermore, without ETI standardization and compatibility, businesses cannot connect their e-invoicing system to other operational IT systems and substantially reduce cost, not only for invoicing, but also for payment, bookkeeping, accounting, and tracking and storing invoices. It is also difficult to verify invoice authenticity and integrity without standardization. E-invoices employing different digital signature formats may need to apply many different methods and processes for each digital signature in order to verify authenticity and integrity. In addition, tax authorities cannot effectively centralize standardized transaction data to their own system and track transaction information at the point of sales without standardization.

In Korea, there were more than 200 different e-invoice formats before standardization, meaning taxpayers potentially needed 200 different document viewers to accept and read different ETIs. In the EU, more than 400 e-invoicing providers offer various services, making it virtually impossible for businesses that used incompatible providers to exchange e-invoices (Mai, 2010). In such cases, it was difficult to expect businesses to invest in e-invoicing because of the risk of incompatibility with their business partners. Standardization and compatibility therefore is critical to expeditious adoption of e-invoices.

For successful standardization, public and private participation is important. Private stakeholders such as e-invoice service providers and e-invoice users with their own legacy systems should be able to agree on common e-invoice standards in order to minimize their adjustment costs. Public sector institutions should also work to coordinate and expedite the standardization process because private sector stakeholders may have conflicting interests in reaching an agreement. With regard to the standardization process, the extent to which the public sector gets involved can raise a thorny issue. It is whether the adoption of ETI standards is sufficient, i.e., whether, even after the standardization, public sector institutions should get to evaluate and certify private sector companies' ETI-issuing capability in accordance with the ETI standards. In Korea, while the ETI standards were established through agreement among private sector stakeholders, the certification of ETIs by the KEIC, a public sector institution, faced opposition from e-invoice service providers. In the end, the certification issue was settled among private sector stakeholders. However, Korea's experience suggests that even ETI standardization and certification did not materially affect ETI adoption as expected. Nevertheless, there was no question that the standardization and certification of ETI were integral to compulsory ETI and contributed to swift introduction of ETIs. If standardization and certification of ETIs had not been cleared before the introduction of the compulsory ETI in Korea, it most likely would have taken much longer to institute the compulsory ETI coming up with

agreement on ETI standards among private sector stakeholders. Therefore, a country working to adopt a compulsory ETI would do well to roll out ETIs with ETI standardization out of the way in advance.

International standards should also be considered when standardization of e-invoicing is introduced because commercial transactions are inevitably international nowadays. Korea adopted XML standards based on the XML Naming Design Rules 2004 and the Core Component Technical Specification 2003, which were adopted by the United Nations Centre for Trade Facilitation and Electronic Business (Korea Institute for Electronic Commerce, 2009).

Against all odds, however, standardization will impose additional burden and cost to businesses depending on the extent of standardization. If only a single standard format is allowed as a legally acceptable invoice, businesses may modify their system to comply with the standard or simply give up e-invoicing altogether. Therefore, a rigid standardization under the optional e-invoicing will slow the pace of e-invoice adoption. If the standards are merely a recommendation for e-invoicing, the effect will likely be limited because the standards will be used by only a limited number of companies that have already adopted the standards or have newly established the standard ETI system following the standardization. Many companies with a legacy system maintain their own non-standardized ETIs until they overhaul or upgrade their system. However, if standardization is accompanied by a compulsory e-invoice, it will speed up the adoption of e-invoicing but most likely add substantial burden on taxpayers.

Incentives for E-invoice

Governments need not necessarily incentivize optional e-invoicing, let alone facilitate or scrap any obstacles to e-invoicing. However, since compulsory e-invoice entails additional burden and cost to taxpayers—especially investment expenditure for IT system or current expenditure for outsourcing e-invoicing in short term—the issue is whether any incentive should be given to the issuers of e-invoices to compensate for any newly incurred costs. Taxpayers may want to issue paper invoices for many reason, e.g., because of their inability to deal with e-invoicing or because of their mere preference. Taxpayers can select any methods to prove a match between their records and transactions either through paper invoices or e-invoices. However, under compulsory ETI, they may have to issue e-invoices even unwillingly, meaning compulsory e-invoicing could test taxpayers' cooperation and compliance. The criticism that the compulsory ETI places tax authorities' administrative convenience above the taxpayers' preference and rights also came up in Korea (Kim & Suh, 2012). To mollify such criticism and taxpayers' resistance, pecuniary and non-pecuniary compensation for the burden and cost associated with e-invoicing may be considered at least during the initial stage of the compulsory introduction. However, once incentives are made available, it becomes difficult to

backtrack. Policy makers must therefore carefully weigh the costs and benefits of incentives before they are granted.

Korea made available both pecuniary and non-pecuniary incentives for its 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. They were also exempted from the requirement to maintain invoice records for five years. Such incentives were expected to lessen VAT compliance cost to a significant extent. In addition, a direct tax incentive—KRW100 (approximately USD0.1) tax credit per one ETI issuance with an annual ceiling of KRW1 million—was also given to reduce the cost of e-invoicing. The relatively small tax credit of KRW100 per one ETI issuance, which was meant to be available only during the first year of compulsory ETI implementation, was designed to subsidize the cost of the Internet or telephone use for e-invoicing. Because of the limited nature of the incentives, they most likely mattered only to small- and micro-businesses. However, Korea's experience demonstrates that once tax credits are introduced, they tend to grow and persist for an extended period. In Korea, the incentives were meant to last only a year after the compulsory ETI was instituted, but they were extended one more year. Similarly, the amount of tax credits grew from KRW100 to KRW200 in consideration of the fact that the average ETI-issuing cost, when outsourced to an ETI service provider, was KRW200 per issuance. The tax credit was scrapped in 2013 for corporate businesses but extended to 2015 for individual businesses as ETIs became compulsory for individual business from 2012, a year behind corporate businesses.

Buyers' Acceptance of E-invoice

E-invoices can be issued conditional on the buyers' acceptance in the EU. This is natural under optional e-invoicing. Under compulsory e-invoicing, however, a question of whether a business supplier should issue an e-invoice arises even when a customer refuses to accept the e-invoice. If a waiver is given in this case, compulsory e-invoicing would not function with many abuses. Under compulsory e-invoice, therefore, some compromises on acceptance conditions become necessary. Korea came up with legislative solutions in order to deal with circumstances where buyers refuse to accept e-invoices. The Presidential Decree for the VAT law provides that, if a buyer does not hold an email account, to which the ETIs can be sent, or does not designate one, the ETI-issuing system established by the NTS (*e-sero*) is to be designated as the email box.⁵¹ The decree further stipulates that when ETIs reach the email box of the customer or the ETI-issuing system established by the NTS (*e-sero*), the ETIs are deemed to have been received by the buyers.⁵² Therefore, if there are any conflicts about e-invoicing between suppliers and customers, it is the customers who should demand that the supplier issue a revised e-invoice rather than

⁵¹ Paragraph 10 of article 68 of the *Presidential Decree of the VAT Law*;

⁵² *Ibid.*, paragraph 11;

merely declining to accept the e-invoice. The derogation for the buyers' acceptance of e-invoicing was inevitable under compulsory ETI. However, there could also be criticism about such derogation. Kim and Sur contended that such ETI-issuing process without the buyers' acceptance only favors suppliers when a legal dispute pertaining to a transaction, a payment, or an invoicing arises (2012). In this respect, Korea's legal solution will be subject to future legal proceedings and rulings.

IV. ASSESSING KOREA'S SUCCESS WITH ETI

Although only four or five years have passed since the introduction of compulsory ETI in Korea, this paper attempts to analyze what it has achieved and what effect it has had on tax compliance. First, an analysis is undertaken on ETI adoption rates, tax compliance cost reduction, and combating tax evasions and frauds using data provided by the NTS and previous research findings. Second, descriptive and statistical analysis are conducted on how Korea's ETI affected tax compliance, the transparency of business transactions, tax service, and taxpayers' burden in ETI compliance using survey results taken from private tax practitioners and business taxpayers in Korea.

1. Analysis of NTS Data

Pace of ETI Adoption

After the introduction in 2011, ETI adoption reached nearly 100 percent as shown in Table 3, a remarkable achievement from around 15 percent before the adoption.

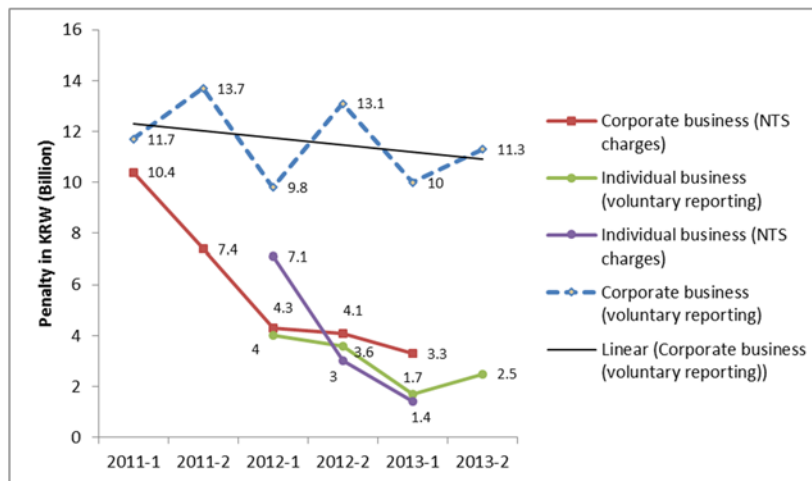
Table 3: Pace of ETI Adoption

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;

As a result of the rapid transition, penalties for late or non-transmitted ETI information to the NTS continued to fall as shown in Figure 6. Penalties assessed on corporate businesses' voluntary reporting fluctuated but gradually declined as shown in the trend line. Other penalties pertaining to NTS charges and individuals voluntary reporting also headed lower.

Figure 6: Penalties for No 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 how much private businesses reduced tax compliance cost through ETIs in 2011 (KIPF, 2011) using the OECD's Standard Cost Model. Their estimation was based on (i) survey of tax employee wages, (ii) input work hours for issuing, receiving, and storing invoices and filing invoice summary reports before the adoption of the compulsory ETI, and (iii) reduction of input work hours after the adoption of the compulsory ETI. Initial transition costs for activities such as for getting acquainted with new rules and regulations, training for employees, and the purchase of new equipment were also surveyed and estimated separately. According to their estimation, the reduction of tax compliance cost came to KRW781 billion (approximately USD710 million) for corporate businesses and KRW198 billion (approximately USD180 million) for individual businesses for a total of KRW978 billion as shown in Table 4. Notably, reductions totaling KRW725 billion (USD660 million) or 74 percent of the total savings took place in issuing and receiving invoices (see Table 4).

Table 4: 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	295.1	301.9	56.7	70.2	56.5	780.5
	(Percent)	(37.8)	(38.7)	(7.3)	(9.0)	(7.2)	(100.0)
Individual Businesses	Cost reduction	16.7	111.3	35.7	23.5	10.4	197.7
	(Percent)	(8.5)	(56.3)	(18.1)	(11.9)	(5.3)	(100.0)
Total		311.9	413.2	92.4	93.8	66.9	978.2

Source: KIPF, 2011;

However, the initial transition cost for ETI was estimated KRW263 billion (approximately USD240 million). Transition cost for corporate businesses came to KRW222 billion, of which KRW158 billion accounted for acquisition cost for new IT systems. On the other hand, transition cost for individual businesses was KRW41 billion. In addition, according to the NTS, cost incurred by the NTS for developing ETI systems including the EWS and operating the systems reached approximately KRW27 billion from 2009 to 2014.

These findings suggested that the benefits of ETIs (KRW978 billion) easily exceed initial private sector investment cost (KRW263 billion) and public sector investment cost (KRW27 billion). If tax revenue increases that resulted from curbing tax evasions and frauds through ETI and EWS and cost savings to the NTS from the new invoice administration are taken into account, the benefits would have been significantly higher.

Combating Tax Evasion and Fraud

Since the EWS based on ETI was introduced in 2012, it has triggered a total of 6,822 early warnings and early verifications for tax evasion and fraud including the pilot operations in 2011. Among them, 1,922 cases or 28.2 percent of the total were investigated. As of the end of the first half of 2014, a total of 1,643 cases of tax investigations were completed, and 1,159 cases or 17 percent of the total warnings/verifications led to charges of misconduct to the government prosecution authority and tax levies that reached KRW1,187 billion (see Table 5).

Table 5: Early Warning and Investigation

	Warnings 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%

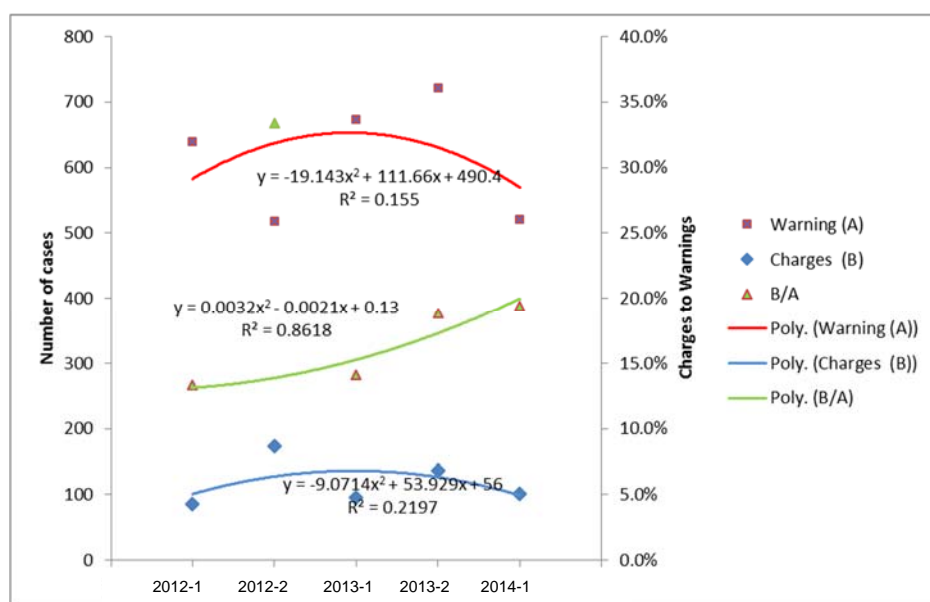
Source: The National Tax Service, Korea;

One area of particular interest is demonstrating to what extent ETI and EWS contributed to the reductions in tax evasions and frauds. 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. There was an upward trend in early warnings during the initial stage of the ETI and EWS implementation, but it shifted downward thereafter. The most likely explanation for the upward and then downward trend is that it increased following an initial learning curb, but it began to decline as the ETI and EWS began to bite tax evasions and frauds. The number of charges for misconduct also demonstrates a

similar trend (see Figure 7). Although the trajectory lines of early warnings and charges of wrongdoing are in downward after the initial increase as shown in Figure 7, they are not statistically robust due to too few data available from the relatively short period of time after the ETI adoption.

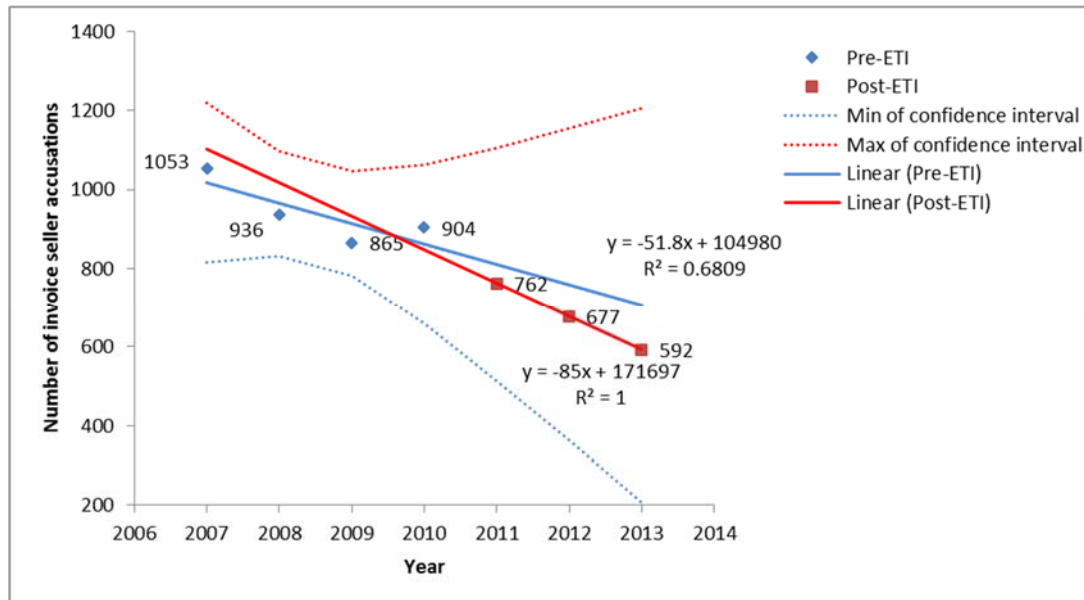
The ratio of wrongdoing charges to warnings triggered rose from 13.3 percent in the first half of 2012 to 19.4 percent in the first half of 2014. The 33.4 percent spike in charges of wrongdoing during the second half of 2012 most likely resulted from the backlog of tax investigations since 2011. Controlling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

Figure 7: Number of Early Warnings and Charges



The number of corporate invoice seller frauds before and after the introduction of ETI is shown in Figure 8. Invoice seller frauds had fallen due to the efforts of the tax authority to combat frauds since 2007. However, a comparison of the pre- and the post-ETI lines shows that the slope of the post-ETI line becomes steeper than the pre-ETI as shown in Figure 8, indicating the introduction of ETI had a dampening effect on tax frauds than before. Pre-ETI invoice seller frauds were predicted to drop by approximately 52 cases annually, but the actual post-ETI figures show a drop of 85 cases each year. The trend line suggested that, had ETI not been introduced, the number of invoice seller frauds would have reached 706 in 2013. The actual figure for 2013 was 592. Again, these are only tentative inferences at best because of the relatively short time period after the ETI adoption. (The actual data were still within the confidence interval of pre-ETI prediction line with 95 percent of confidence as shown in Figure 8.)

Figure 8: Pre- and Post-ETI Invoice Seller Fraud Cases



2. Analysis of Perception Survey Data

A survey was conducted to find how Korean taxpayers and private tax practitioners perceived the introduction of compulsory ETI. The survey results were collected from 342 respondents with 332 valid responses⁵³ including tax accountants and practitioners, certified public accountants, lawyers, and business taxpayers from October to December, 2014. The survey findings are summarized in Table 6 below.

Table 6: 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 businesses file more accurate VAT return after the compulsory ETI?	More accurate	Equally accurate	Equally inaccurate	More inaccurate	
	75.9%	19%	4.8%	0.3%	

⁵³ See Annex 1, the demographics of the survey respondents.

3. 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%
4. 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%
5. What is your opinion about scaling up the obligation of ETI henceforth?	5.1%	14.8%	20.8%	43.1%	16.3%
6. Do you think taxpayers' burden has increased after the introduction of compulsory ETI?	3.0%	18.1%	26.5%	45.8%	6.6%
7. Do you think electronic tax administration including ETI reduces the possibility of tax evasion?	1.2%	10.5%	20.5%	58.1%	9.6%

The survey results showed very positive assessment 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. There was no statistical difference of perception between tax practitioners and taxpayers. (The Chi-square tests on responses from tax practitioners and taxpayers to each question showed the responses were independent of whether the respondent was a taxpayer or a tax practitioner.)

Regarding the question of 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 return 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. It is most likely due to the

short term transition costs for IT systems, employee training, and other similar costs. However, such negative assessments were outweighed by positive assessments for the reasons of tax evasion prevention, transaction transparency, and taxpayer service. Greater taxpayer convenience and longer-term cost savings in invoicing—electronic invoice issuing and receiving, exemption of submitting aggregate summary lists of invoices containing transaction information, exemption from the obligation of five-year storage of invoices, and other savings in transaction operations—likely affected the perception on taxpayers’ burden. In addition, positive response from 59.4 percent of the respondents on expanding ETI compliance to wider individual businesses demonstrated that people were receptive to compulsory ETI despite the initial cost.

Lastly, in response to the question on the likely effect of electronic tax administration, 67.7 percent of the respondents stated that tax evasion would decline. For the ranking of the importance of seven selected factors likely to encourage tax compliance, enhancing tax equity, trust of tax administration, and electronic tax administration were ranked higher than tax audit and punishment on tax evasion (see Table 7). What such findings point to is the possibility of electronic tax administration incorporating the traditional economic approaches, and the normative and cognitive approaches as stated in the introduction.

Table 7: Responses to Rankings of Tax Compliance Factors

	Mean of rankings	Std. Dev.	Mode of rankings	Frequency of 1 st ranking
Enhancing tax equity	3.2 (1)	0.7	3	62 (2)
Enhancing trust on tax administration	3.4 (2)	0.7	1	72 (1)
Electronic tax administration	3.6 (3)	2.8	4	58 (3)
Enhancing tax administration service	3.7 (4)	2.1	3	37 (6)
Reinforcing punishment on tax evasion	4.5 (5)	2.8	6	41 (5)
Tax rate cut	4.7 (6)	3.5	7	42 (4)
Reinforcing tax audit	4.9 (7)	4.2	6	20 (7)

Note: Figures in parenthesis denote rankings.

V. CONCLUSION

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 advances in ICT into tax administration and broaden the tax base, but also to better serve taxpayers and reduce their tax compliance cost. Taking bold steps to institute compulsory ETI, Korea’s tax authorities endeavored to offset the initial transition costs and administrative burdens

by relieving taxpayers of the duty to submit aggregate summary lists of invoices and store invoice records for five years. The tax authorities also introduced KRW200 in sunset tax credit for ETI issuance to compensate for the cost of the Internet or outsourcing ETI issuing. The NTS also took various measures to facilitate e-invoicing. It launched *e-sero*, an ETI-issuing website, and a telephone automatic response system to help small companies and individual businesses lacking their own IT systems issue ETIs for free.

Such concerted efforts ultimately paved the way for the successful implementation of compulsory ETI. The ETI adoption rate in terms of transaction value reached 99.8 percent during the first year of introduction in 2011 and 99.9 percent by 2013, which compares to 15 percent before the compulsory ETI. According to estimates by the NTS and Korea Institute of Public Finance, ETI cut taxpayers' compliance cost by KRW978 billion (approximately USD890 million) after incurring KRW263 billion (approximately USD240 million) for initial transition costs including the purchase of new IT systems and employee training. Investment cost to the NTS for various ETI support systems and their operational cost from 2009 to 2014 was estimated at approximately KRW27 billion. Therefore, ETI has helped taxpayers and the tax authority achieve substantial cost savings since its introduction.

A survey of tax practitioners and employees of business taxpayers also showed that compulsory ETI had a significant effect on tax compliance, the transparency of business transactions, and taxpayer service. 69.4 percent of the respondents agreed or strongly agreed that tax evasion would decline as a result of greater transaction transparency brought about by ETI. 72.9 percent of the respondents agreed that taxpayer service improved after the introduction of ETI as a result of the convenience of e-invoicing and e-tax filing. Although 52.4 percent of the respondents agreed that taxpayers' burden increased following the introduction of ETI, only 19.9 percent of the respondents were against the idea of subjecting more businesses to ETI by lowering the threshold for the compulsory ETI, which is currently set at the annual turnover of KRW300 million. The positive survey results likely reflect the success of the efforts of the tax authority to reduce taxpayers' compliance costs as noted above. A tax authority contemplating compulsory ETI therefore can mitigate the negative effects of compliance burden by carefully taking measures to better serve taxpayers and to reduce taxpayers' compliance costs.

At the introduction of this paper, the author suggested electronic tax administration including ETIs as a holistic approach to improving tax compliance in order to incorporate both the institutional and legislative approach and the normative and cognitive approach so that ETI can bring about not only institutional changes, but also normative changes. A review of Korea's experiences in this paper gives credence to the contention that a well-planned and well-executed compulsory ETI can significantly enhance tax compliance in a holistic approach comprising both the institutional and legislative approach and the normative and cognitive approach. Korea's compulsory ETI induced significant institutional changes. It brought about

fundamental changes to the invoicing mechanisms and processes by scrapping paper-based invoicing, the summary report of invoices to the NTS, and invoice storing for five years. In addition, the simultaneous introduction of EWS and compulsory ETI enhanced the tax administration system, giving the tax authorities real-time access to tax information and the capability to detect fraud through the electronic systems. At the same time, it also strengthens the tax authority's ability to boost tax morale, raising confidence in tax administration by improving taxpayer service. As suggested by the survey findings, Korea's tax practitioners and business taxpayers place electronic tax administration between the institutional and legislative approach and the normative and cognitive approach in terms of effectiveness in raising tax compliance. This further alludes to the potential of electronic tax administration to provide an effective tool for tax compliance through the harmonization of economic and non-economic compliance factors.

Lastly, the analyses and findings of this paper point to some insights and considerations for tax authorities that are contemplating ETI with the benefit of the hindsight of Korea's experience.

First, compulsory ETI can be an effective way to expedite ETI because it eliminates the market failure problems—the “prisoner's dilemma” with asymmetric information. However, compulsory ETI must be carefully designed to minimize taxpayers' burden. In particular, tax authorities should take the due care to make available facilities and avenues through which SMEs, micro businesses, and small individual businesses can easily issue and transfer ETIs to their customers for free or at a very low cost. In addition, a gradually phased-in ETI is one approach to avoiding initially heavy compliance cost to small and micro businesses. Compulsory ETI can thus begin with large corporations and then expand to smaller companies in a foreseeable timeframe.

Second, tax authorities pursuing compulsory ETI should focus on reducing compliance cost and improving taxpayer service so that it builds and accumulates trust in tax administration. A compulsory ETI lacking such attributes is more likely to fail because of taxpayers' resistance to tax reform or taxpayers' preference for status quo in the informal economy. Tax authorities must also expect to reward taxpayers for their compliance and cooperation with compulsory ETIs in the form of tax service and cost-reduction. If a compulsory ETI produces tangible benefits to taxpayers eliminating the uncertainty of counterparty ETI acceptance, it will firmly take root in the VAT system.

Third, tax authorities should roll out tax information analysis systems simultaneously with the introduction of ETI so that they can fully utilize ETI's automatic self-checking mechanism in the VAT regime. Utilizing such systems, the tax authorities can build their capability to provide customized information for taxpayers (before they file tax returns) on the basis of transaction-level information at or near the point of sale, thereby preventing any incorrect or improper input-tax credit claims. In

particular, such systems will help expedite the refund administration for input tax claim in developing countries that have substantial tax claim backlog. At the same time, the systems will play a pivotal role in detecting fraud even before tax returns are filed and provide powerful tools that can be utilized to verify tax return that are filed.

Fourth, close collaboration among the tax authorities, the IT governance body on electronic data interchange, and private IT solution providers is essential. ETIs come with not only tax components, but also 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, it would take longer to introduce a standardized compulsory ETI system. Standardization of ETIs adopted through agreement between the public- and the private-sector stakeholders before the introduction of the compulsory ETI would significantly shorten the preparation time for ETIs. In addition, the technical reliability and security of the ETI system is critical for a smooth rollout of ETI. Tax authorities and IT system providers must therefore closely cooperate to build a user-friendly, reliable, and secure electronic system. Taxpayers' perceived risks of system malfunction, glitches, or privacy should be minimized to effectively introduce e-invoicing (Kamarulzaman & Azmi, 2010).

Finally, tax authorities, including those of Korea, can benefit from more research on protecting the rights of customers who receive ETIs against their will under the compulsory ETI system. As noted earlier, Korea relaxed conditions for ETI acceptance by customers, making it easier for businesses to fulfill their ETI obligation by having customers request revising, not refusing, e-invoices. Although loosened conditions for customer acceptance of ETIs are inevitable under a compulsory ETI system, it precludes the right of customers to reject ETIs in conflicting situations. Tax authorities therefore will need to come up with accommodating measures to protect customers' rights with either the benefits of future court rulings or the experience of other countries.

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Annexes

Annex 1: Demographics of Survey Respondents

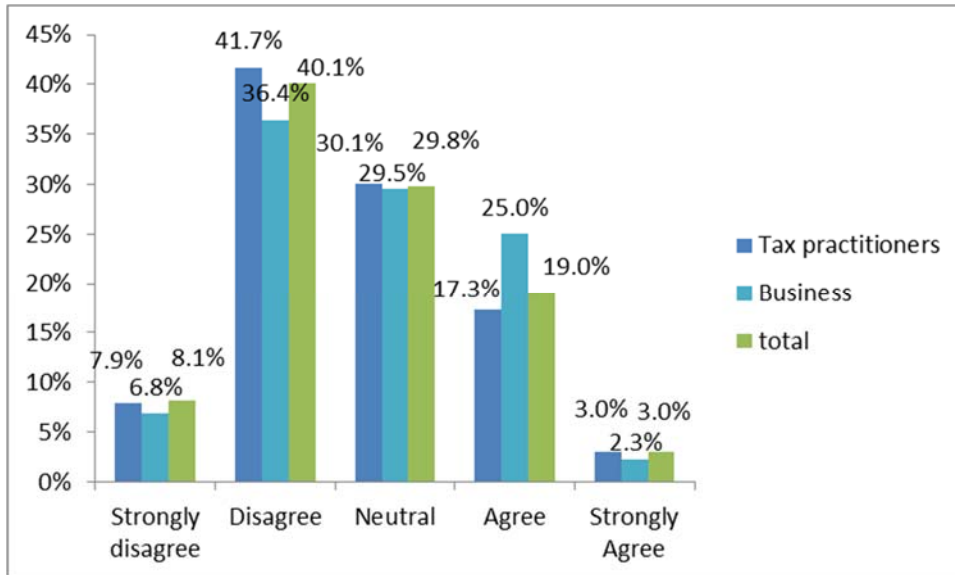
Occupation	Tax accountant and practitioner	111	33.4%
	CPA	140	42.2%
	Lawyer	15	4.5%
	Business taxpayer	44	13.3%
	others	22	6.6%
Age	20s	59	17.8%
	30s	151	45.5%
	30s	46	13.9%
	50s	28	8.4%
	60s	36	10.8%
	70s and over 70s	12	3.6%
Gender	Male	230	69.3%
	Female	102	30.7%
Total		332	100.0%

Annex 2: Contingency Table of Response and Results of Chi-Square Tests

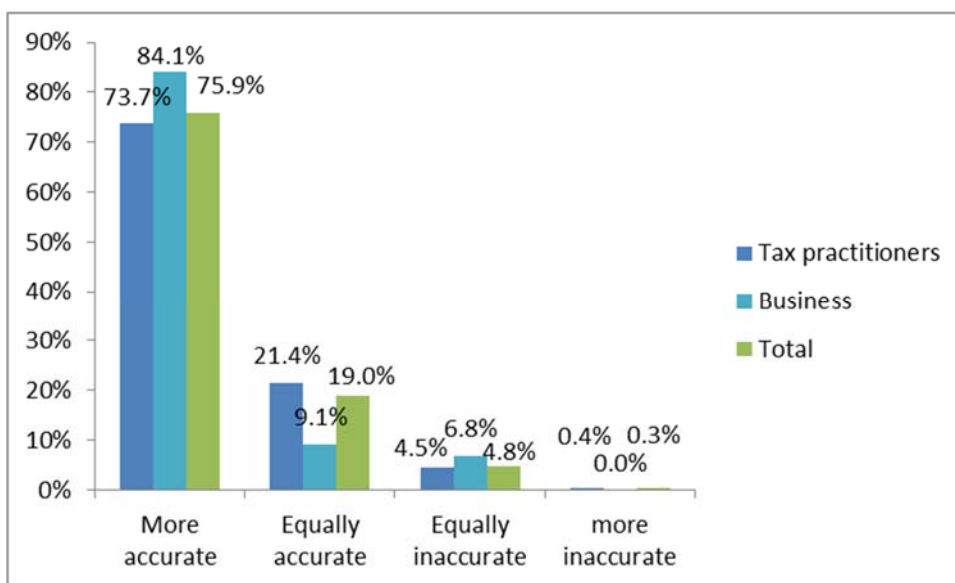
Questions	Respondents group	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree	Sum	Chi-Square test
1. Do you think there are many VAT evasion cases in Korea such as underreporting sales or creating fake invoices?	Tax practitioners	21	111	80	46	8	266	$\chi^2 = 1.6152$, df = 4, p-value = 0.8061
	Business taxpayers	3	16	13	11	1	44	
	Sum	27	133	99	63	10	332	
2. Do you think businesses file more accurate VAT return after the compulsory ETI?		(More accurate)	(Equally Accurate)	(Equally inaccurate)	(More inaccurate)		Sum	X-squared = 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	
3. Do you think compulsory ETI will significantly contribute to curbing VAT evasions 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	
4. 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	
5. 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	
6. Do you think taxpayers' burden has 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	
7. 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	

Annex 3: Response by Respondents Group

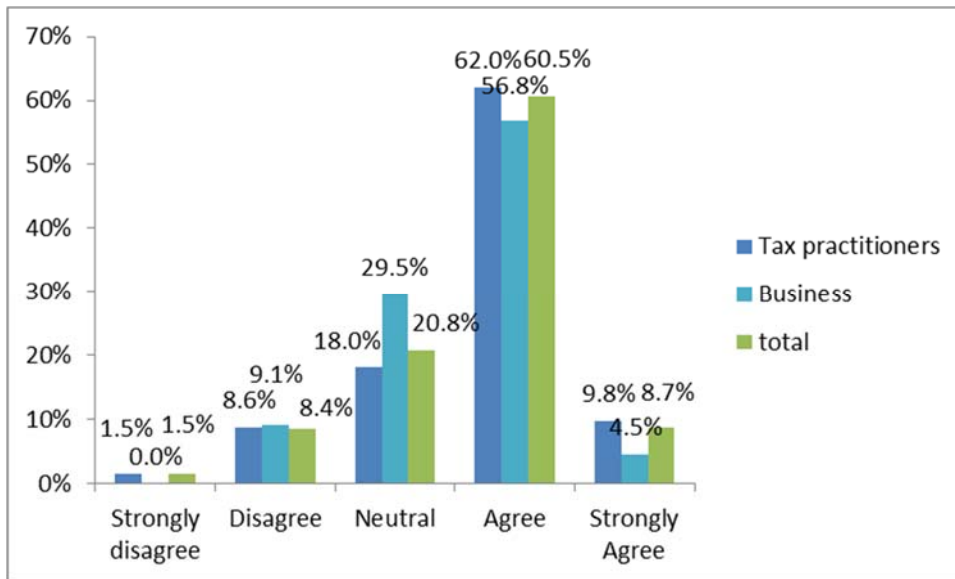
1. Do you think there are many VAT evasion cases in Korea such as underreporting sales or creating fake invoices?



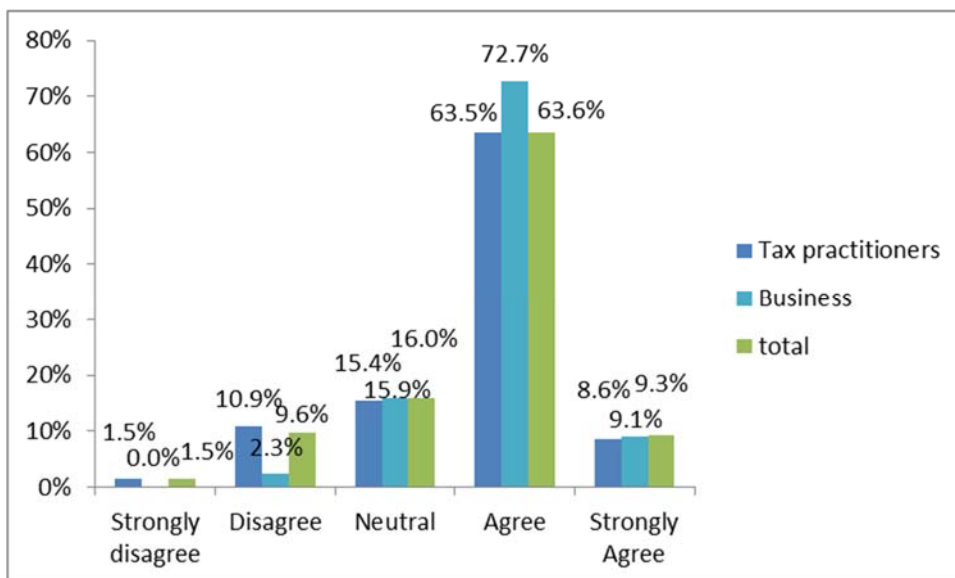
2. Do you think businesses file more accurate VAT return after the compulsory ETI?



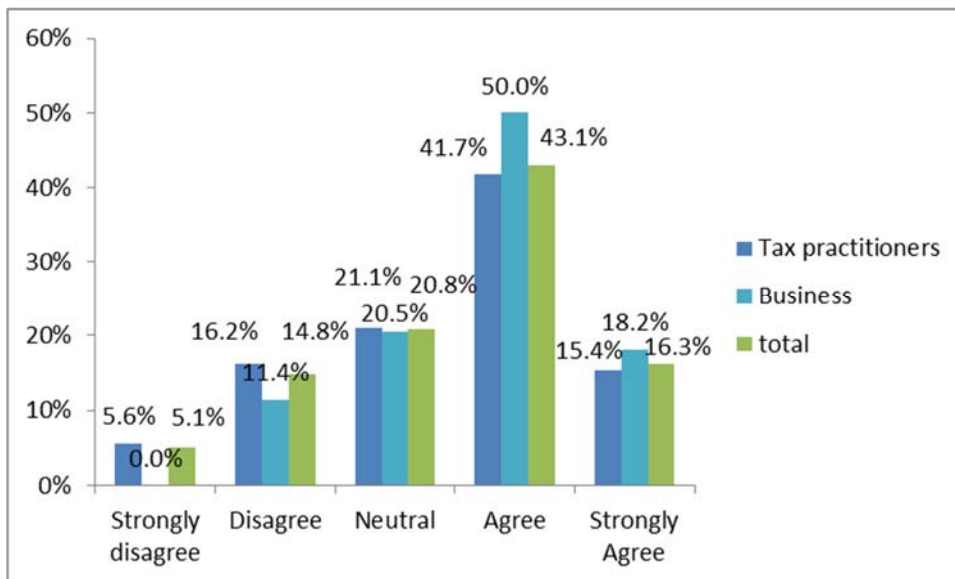
3. Do you think compulsory ETI will significantly contribute to curbing VAT evasions by enhancing transaction transparency (i.e., real-time access to transaction information)?



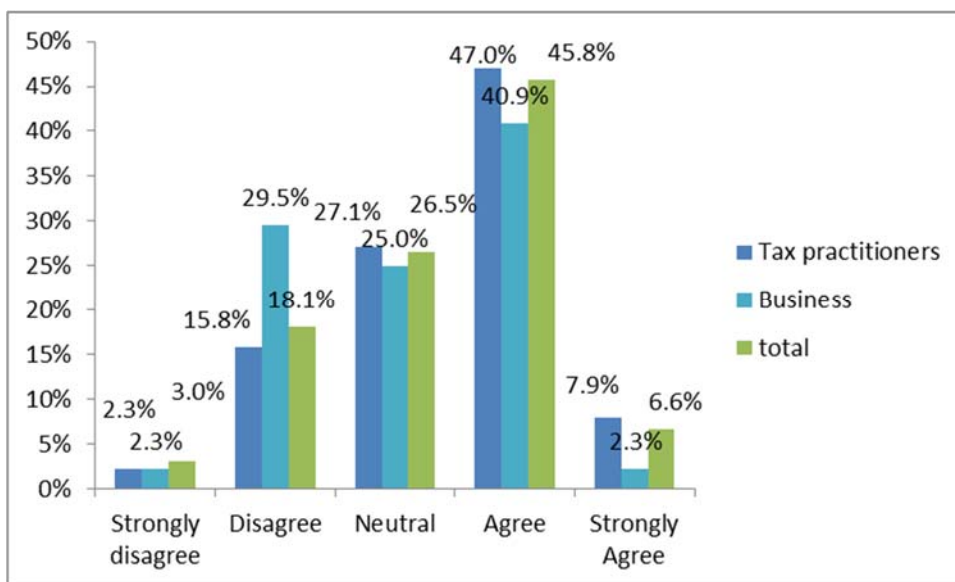
4. Do you think compulsory ETI has improved taxpayer service by facilitating tax filing, for instance, through automation of invoice issuance?



5. What is your opinion about scaling up the obligation of ETI henceforth?



6. Do you think taxpayers' burden has increased after the introduction of compulsory ETI?



7. Do you think electronic tax administration including ETI reduces the possibility of tax evasion?

