

Critical Success Factors of the Web-based Tax Invoice System in Korea

Tae Sup Shim¹, In Kuk Song²

¹The Graduate School of Science in Taxation, University of Seoul
Seoul, South Korea

[e-mail: tsshim@uos.ac.kr]

²School of Management, Dankook University

Suji, Gyeonggi-Do, South Korea

[e-mail: iksong@dankook.ac.kr]

* Corresponding author: In Kuk Song

*Received August 19, 2016; revised September 9, 2016; accepted September 26, 2016;
published September 30, 2016*

Abstract

Recently tax authorities in the world have been adopting advanced information technology over the Internet into their processes. Websites that enable filing tax returns and paying tax electronically have been implemented in many countries. However, the tax authorities have difficulties in forcing the mandatory system because taxpayers do not feel comfortable with readily capturing their incomes by the system. This study aims to provide a guideline for successful implementation of the mandatory e-tax invoice system. First, the study focused on investigating whether the Korean e-tax invoice system was implemented successfully. Secondly, the study assessed actions that might contribute to its successful implementation. The analyses identify that establishing a free website for small-sized taxpayers and providing various issuing systems for diverse taxpayers are critical for its success. The results also enable the tax administrations aspiring to introduce a mandatory system to emphasize some specific actions, which have significant effects on its desired purposes. Finally, this study presents the various policy implications that previous studies have not provided.

Keywords: e-tax invoice system, web-based system, governmental policy, value added tax

1. Introduction

With the advent of information technology, tax authorities in the world have been adopting the advanced information technology over the Internet into their processes. Websites that enable filing tax returns and paying tax electronically, have been implemented in many countries. Specifically an electronic tax invoice system allows issuance, distribution, and immediate transmission of tax invoices to the tax authority online. Under Value Added Tax (VAT) system, tax invoices are very valuable. Tax invoices refer to evidence of a transaction issued when goods and services are supplied. Tax invoices are the major source of taxation data for individual and corporate income tax because they include information of the item prices and tax for the transactions. Under the VAT law, when a general taxpayer supplies goods or services s/he must issue a tax invoice and submit it to the tax authority.

A paper tax invoice has been used for issuing and submitting it to the tax authority for a long time. With the rapid growth of information technology, however, many countries converted the manual process of issuing tax invoices to electronic system. While a paper tax invoice takes a certain period of time to get transmitted to the tax authority, an electronically issued tax invoice (e-tax invoice) can be submitted to the tax administration immediately as soon as it is implemented.

Compared with paper invoices, e-tax invoices have many benefits. Taxpayers do not need to send tax invoices by mail and to prepare the spaces for keeping paper tax invoices. From the perspective of the tax authorities they do not have to cross check the two copies of tax invoices, which were reported from both the seller and the purchaser. Since e-tax invoices are submitted to the tax authority immediately after they are issued, e-tax invoices are not apt to be retouched easily. Consequently the e-tax invoice assures reducing tax invoice fraud. In addition, e-tax invoice system allows real-time tax audit or ex-ante tax audit, while ex-post tax audit has usually been conducted under a paper tax invoice system.

Although many countries have already introduced e-tax invoice systems, most countries tend to allow issuing paper tax invoices at the same time. Under such the circumstance, e-tax invoices and paper invoices are treated equally, so the benefits of an e-tax invoice system cannot be fully realized. Recently, a few countries have implemented mandatory e-tax invoice systems, under which certain taxpayers are obliged to issue e-tax invoices only, not allowing them to issue paper invoices. Nevertheless, the mandatory e-tax invoice systems in those countries do not apply to all corporate taxpayers, and not to sole proprietors [1, 2, 3]. Uniquely, the Korea tax authority (National Tax Service, NTS) applied a mandatory e-tax invoice system to all corporate taxpayers from 2011. Under the mandatory circumstance, all corporate taxpayers and certain individual taxpayers in Korea must issue tax invoices electronically, and must transmit them immediately to the tax authority.

Today, many countries accept e-tax invoices, and a growing number of countries legally require them for tax purpose [4]. That is, many tax authorities worldwide are willing to convert their current voluntarily e-tax invoice systems to a mandatory system. The tax authority began to perceive that a mandatory e-tax invoice system is more useful than a voluntary system. However, it is not easy for the tax authority to force a mandatory system, because taxpayers do not feel comfortable with readily capturing their income by the mandatory system. By reviewing and evaluating the mandatory e-tax invoice system in Korea, this study can provide some policy implications to other countries in designing their e-tax invoice systems. Through the analysis of the Korean mandatory e-tax system development process, the countries planning to implement a new e-tax invoice system can understand better what to consider at the point that they convert the current voluntary e-tax invoice systems to

mandatory ones.

The purposes of this study are divided into two issues: First, this study aims to investigate whether the Korean e-tax invoice system has been implemented successfully. Since three years have passed since its initial introduction., it might be a good time to evaluate the the Korean e-tax invoice system. Especially, this study investigates the Korean e-tax invoice system from the users' perspectives, not from the tax authority's perspective, because users evaluate the successful implementation of the e-tax invoice system more objectively.

Secondly, this study assesses which actions contributed to its successful implementation. The NTS has introduced many measures to implement the mandatory system more successfully, but not all the actions might have contributed to the system's success. Since many nations have tried to extend the use of their e-tax invoice system for tax purposes, this study can give some useful policy implications for them by finding out the actions contributing to system success.

Even though many researches has been conducted on the technical aspects of accounting information systems including e-tax invoice systems, such researches have not considered how to implement an e-tax invoice system more successfully. In other words, most previous studies had heavily focused on the technical sides of the e-tax invoice system. The current IT techniques have solved many of the previous technical problems of e-tax invoice systems. Thus, for tax administrations who are trying to implement an e-tax invoice system successfully, it is more important to perceive how to implement a mandatory e-tax invoice system. In this regard, the rigorous research endeavours that investigate the tax administration's actions rather than technical features of the system is needed. This study can provide various policy implications that previous studies have not pointed out.

2. Electronic Tax Invoice System

2.1 New System and Potential Benefits

A tax invoice is a receipt in a certain format that a business taxpayer issues to the other party through a transaction. The e-tax invoice system is an online system that enables online issuance and distribution of a tax invoice, and its transmission to the tax authority [5]. There are many benefits when taxpayers issue e-tax invoices. First, they can reduce time and cost related with tax invoices. For example, taxpayers do not need to put tax invoices into envelopes with stamps, and send them through the postal system or by courier to their clients. When clients receive the paper invoices, they must check that the information in the invoice is correct and manually enter the details into their system before the payment can be approved. However, using an e-tax invoice system, this whole process can be fully automated without manual intervention.

With automatic cross-checking, an e-tax invoice system can reduce time and costs to create, send, receive, check, approve, and pay for a tax invoice. Taxpayers usually do not need large spaces to keep paper tax invoices. Also, they do not need to submit the details of paper tax invoices, so the time to prepare a VAT tax return can be reduced dramatically [6].

From the viewpoint of the tax authority, the key benefits of an e-tax invoice system are efficiency and cost reduction. Usually, under an e-tax invoice system, e-tax invoices are submitted automatically to the tax administration, so the tax authority gets details of e-tax invoices in real time, and can analyze them in advance. Thus, real-time audit or ex-ante audit by the tax authority becomes possible, while only an ex-post audit can be conducted under a traditional paper tax invoice system. The e-tax invoice can provide excellent auditability for

any tax administration in any country. In short, the tax authority can reduce the time and costs of a tax audit [4].

Also, under an e-tax invoice system, it is very difficult to issue a tax invoice retrospectively, and it does not take too long from filing to the identification of fraud. Therefore, an e-tax invoice system can reduce fraudulent tax invoices, and can increase tax data transparency by reducing tax invoice frauds.

2.2 Usage of the System in the World

Many countries allow issuing tax invoices electronically. According a survey in 2013, 65 countries in the world had accepted e-tax invoice systems [4]. However, the specific features of the systems, and especially the implementation methods (mandatory vs. voluntary), differ somewhat from country to country.

In Europe, for the convenience of international trade, electronic invoicing has been developed. Because of its economic effect and operational efficiency, the European Union (EU) has tried to harmonize the laws of its member states relating to VAT. Especially, the EU has tried to harmonize the contents of a tax invoice, and accepted the e-tax invoice. In 2001, Directive 2001/115/EC stated that “Invoices may be sent either on paper or, subject to acceptance by the recipient, by electronic means [7].” After allowing e-tax invoices in the EU, many EU countries allowed issuing e-tax invoices. However, few countries introduced a mandatory e-tax invoice system, so, to date, an e-tax invoice and a paper invoice are treated equally in the EU.

Latin America has implemented systems that are more mandatory than the EU, and many countries in Latin America introduced e-tax invoice systems quickly. The consequences of issuing or receiving non-compliant invoices are therefore in many cases much more direct and tougher than in other regions. In Brazil, for example, non-compliance with certain rules can be penalized at up to 150% of the value of the supply [4]. However, in Latin American, not all corporate taxpayers are eligible for the e-tax invoice system, and the systems usually have not been implemented for individual taxpayers.

Some countries in Asia and Africa also allowed e-tax invoices, but similar to EU countries, most countries still treat an e-tax invoice and a paper invoice equally. However, in the Republic of Korea (Korea), the e-tax invoice system was implemented in a mandatory manner, beginning in 2011. That is, all corporate taxpayers and certain sole proprietors must issue e-tax invoices only, and are no longer allowed to issue paper invoices.

2.3 Mandatory Electronic Invoice System in Korea

In Korea, since 2001, e-tax invoices were introduced, but the voluntary e-tax invoice system was changed to a mandatory system in 2011. That is, all corporate taxpayers must issue only e-tax invoices from 2011, and from 2012 sole proprietors with supplied value of 1 billion KRW (approximately US\$ 1,000,000) or more must also issue only e-tax invoices. Compared with other countries' systems, the Korean mandatory e-tax invoice system has some special features [8].

Above all, the Korean e-tax invoice system has been implemented for all corporate taxpayers, regardless of sales volume and type of business. That is, the e-tax invoice became compulsory for all corporate taxpayers in Korea. If a corporate taxpayer fails to issue and submit e-tax invoices electronically to tax authorities, relevant penalties shall be imposed. Some countries implemented mandatory e-tax invoice systems for certain types of business. For example, since 2005, some European governments have started to make e-invoicing mandatory in the public sector [6]. In Turkey, corporate taxpayers in some industries (lube oil firms, licensed taxpayers, and taxpayers who produce, construct, and import cola drinks,

alcoholic drinks, and tobacco products, and other taxpayers who purchase products from the mentioned groups) should issue their invoices and keep their legal books in electronic format [2]. Some countries have implemented the e-tax invoice systems for certain big corporate taxpayers. For example, in Mexico, a company that earns 250,000 Pesos (approximately US\$20,000) or more annually should send an e-tax invoice as a receipt of all business transactions from 2014. Unlike these countries, the Korean tax authority implemented the e-tax invoice system for all corporate taxpayers, with no exceptions.

Secondly, certain individual taxpayers in Korea must also only issue e-tax invoices. That is, sole proprietors with a supplied value of 1 billion KRW or more must issue and submit e-tax invoices since 2012. Few countries have implemented an e-tax invoice system for individual taxpayers. In Korea, tax evasion by individual taxpayers (especially, sole proprietors) is known to be a bigger problem than by corporate taxpayers, and the tax authority has tried to reduce this. In this regard, the NTS introduced the e-tax invoice system to sole proprietors. In 2012, the sole proprietors to whom this applied were 13.9% of all sole proprietors in terms of tax amount. From 2014, the applied amount has been changed from 1 billion KRW (approximately US\$ 1,000,000) to 0.3 billion KRW or more. Thus, the portion of sole proprietors to whom this applies will be increased greatly.

Third, systems for issuing e-tax invoices have been prepared for all types of taxpayers, especially for small-sized taxpayers. That is, there are different systems for issuing e-tax invoices, depending on the taxpayer's IT environment. A large corporation that has its own in house ERP system or uses an Application System Provider (ASP) may use its own system to issue and transmit tax invoices. A taxpayer who does not have an adequate IT system can use the portal, which is a website run by the Korean tax authority. The portal is a web application, called "e-sero" (www.esero.go.kr). Using the portal, users can issue an e-tax invoice, and email it to the customer. Also, all such issued tax invoices are transmitted to the tax administration automatically. The e-sero service is available for free. To use e-sero, users log on to the system using an authenticated certificate. Those who have no access to the internet can use the automatic response system (ARS) call service or to visit a local tax office to issue e-tax invoices. By providing the various issuing systems, taxpayers who must issue and transmit e-tax invoices mandatorily can issue and submit them conveniently. Also, taxpayers do not need to pay for sending paper tax invoices by mail, do not need to keep invoices, and do not need large spaces for keeping paper invoices. By preparing the various e-tax invoice issuing systems for all types of taxpayers, especially for those who do not have an adequate IT environment, the Korea tax authorities have tried to increase usage of the Korean e-tax invoice system.

Fourth, all tax invoices issued must be transmitted to the tax authority immediately when they are issued. When using the e-sero system, the transmission is made automatically right after an e-tax invoice is issued. By these processes, the tax authority can reduce tax evasion by small-sized taxpayers. For the ERP/ASP users, they can transmit e-tax invoices to the NTS by the 10th day of the next month, because they usually issue them within a certain period (e.g., once a month). Through the Korean e-tax invoice system, therefore, all issued invoices will be transmitted to the tax authority and saved in the storage of the tax administration, and the NTS can analyze them in advance. In the case of paper invoices, which are transmitted every 3 months, they can easily be revised, or issued after the legal period provided by tax laws. Sometimes, paper tax invoices were not issued at all. However, under the mandatory e-tax invoice system, the NTS is able to know the details of tax invoices when they are issued. It is expected that this system will decrease tax invoice frauds and the compliance cost of taxpayers.

Additionally, using the e-tax invoice system, taxpayers can file their VAT tax returns more easily. After introducing the e-tax invoice system, the NTS exempted some obligations and tax reports for taxpayers. Before implementing the system, Korean taxpayers must submit a summary table of tax invoices. However, taxpayers do not need to prepare the summary table and need not submit it to the tax authority from 2013, because the Korean e-tax invoice system can prepare it.

Unlike other nations' system, the Korean e-tax invoice system was implemented in a mandatory manner, so all corporate taxpayers and certain individual taxpayers must issue e-tax invoices only and must transmit them to the tax authority. However, it has been uncertain as to whether this mandatory e-tax invoice system in Korea has been implemented successfully. About 3 years have passed since the Korean e-tax invoice system began to be implemented, so it might be appropriate time to investigate the success of the e-tax invoice system.

3. Theoretical Basis and Hypothesis Development

3.1 Previous Research

Most previous research on the e-tax invoice system studied technical aspects of an e-tax invoice system. For example, Attali et al. [9] analyzed the technical characteristics of the e-tax invoice system of Chile. Suwisuthikasem and Tangsrapiroj [10] studied technical aspects of the system in Thailand. With advances in IT knowledge and research on the technical aspects, many tax authorities can share their technical knowhow regarding their systems. Therefore, some tax administrations were able to introduce very similar systems in their countries. For example, tax administrations of Chile, Turkey, and Korea use similar systems of issuing e-tax invoices for various taxpayers.

Recently, tax authorities have tried to provide more satisfactory services to their users, so some studies have investigated user satisfaction with the electronic services of tax authorities. Floropoulos et al. [11] measured the success of the Greek Taxation Information System (TAXIS) using a service quality model of marketing research (e.g., Parasuraman et al. [12]), and the information system success model (e.g., Delone and McLean [13, 14]). Also, they investigated the success of TAXIS from the perspective of expert employees, who work for the public taxation agencies. Using Delone and McLean's updated IT success model, they found that the 'information quality' and 'service quality' had significant effects on 'perceived usefulness' and 'user satisfaction' with TAXIS at the 5% significance level. However, the system quality of TAXIS had no significant effects. Although Floropoulos et al. [11] involved user satisfaction in their study, it was still focused on the technical aspects of the information system.

The previous studies on technical aspects of e-tax invoice systems can provide technical implications, but they do not give policy implications for the tax administrations that have plans on implementing a new mandatory e-tax invoice system. Therefore, a deep analysis is needed to give information on the implementation process of a mandatory e-tax invoice system.

Unlike previous studies, this study is to find which actions actually contributed to the success of the e-tax invoice system in Korea. Some countries, especially in Latin America, have tried to implement mandatory e-tax invoice systems for tax purpose. Although a mandatory e-tax invoice system give more benefits to the tax authority than the voluntary system does, however, it is not easy to implement an e-tax invoice system in a mandatory manner.

In Korea, the mandatory e-tax invoice system was not introduced by the time that the NTS scheduled to launch it. After the preparatory period, the NTS tentatively decided to implement the system. However, the NTS faced oppositions from taxpayers, and even the members of the National Assembly. Thus, they postponed the launch schedule for all corporate taxpayers, and again for certain sole proprietors. Also, the NTS prepared many measures for taxpayers who adopted the system voluntarily. For example, the NTS developed various issuing systems with which all types of taxpayers could issue invoices electronically depending on their IT environments. The NTS also gave tax credits for electronically issued tax invoices.

This study is to investigate which actions, introduced by the NTS to implement the mandatory system, contributed to the success of the e-tax invoice system in Korea. Using the implementation experience in Korea, many countries who have plans on implementing a mandatory e-tax invoice system, may obtain some policy implications. In this regard, this study presents some policy implications that previous research has not provided by investigating which actions contributed to the successful implementation of the mandatory e-tax invoice system.

Additionally, this research examined the fundamental systems of tax authorities for tax invoices including important tax data under the VAT regime. While some studies have dealt with the filing system of the tax authority (e.g., Lee et al. [15]), this study focused more on the electronic system of the tax authority.

3.2 Research Hypothesis

The first objective of this study is to investigate whether the e-tax invoice system is implemented successfully. To satisfy this objective, this study assessed the success of the Korean e-tax invoice system from the users' perspective. The corresponding hypotheses is provided as follows:

H1: From the users' perspective, the Korean e-tax invoice system is successfully implemented.

Most research on information success has evaluated the system success from users' perspective, so the this study evaluated the success of the e-tax invoice system from users' perspective as well.

The second and major purpose of the study is to find which actions, introduced for implementing the Korean e-tax invoice system, contributed to the success of the Korean e-tax invoice system. That is, this research is to investigate which actions have significant impacts on the successful implementation of the system. To satisfy this objective, the relationship between the major actions and the user evaluation was analyzed first. The actions that had significant effects on the success of the Korean e-tax invoice system was investigated. Therefore, an alternative hypothesis is set as follows:

H2: All major actions, which were introduced in implementing the mandatory e-tax invoice system in Korea, have impacts on the users' evaluation on the success of the Korean e-tax invoice system.

The results of H2 may have policy implications for the countries who want to change their voluntary e-tax invoice system to a mandatory system, or for those who have plans on implementing a new e-tax invoice system. Recalling the experience of system development in Korea, implementing a mandatory e-tax invoice system without any trouble is not an easy task.

4. Methodology

4.1 Subject

The users of e-tax invoice system were selected as respondents, because the mandatory e-tax invoice system should be evaluated from the users' perspectives. There are many types of users for the e-tax invoice system in Korea. To reflect various opinions, this study selected three types of users: 1) tax preparers, 2) staff accountants in tax preparation offices, and 3) taxpayers. For the tax preparers, Certified Public Accountants (CPAs) and Certified Tax Accountants (CTAs) were selected since only CPAs and CTAs can prepare tax returns legally in Korea.

According to interviews with CPAs at large firms, including Big 4 accounting firms, it turned out that they had no such deep ideas regarding implementation of the e-tax invoice system. This is because they typically used the outputs of their clients' systems for auditing purposes. Also, most clients of the large accounting firms have already used their own electronic tax invoice system even before the e-tax invoice system was introduced. Thus, implementation of the mandatory e-tax invoice system has no or little impacts on CPAs at large accounting firms. However, a CPAs working as a sole proprietor or in small accounting firms were clearly aware of the introduction process of the mandatory e-tax invoice system. The reason for this might be that they usually keeps the books, prepares the finance statements, and files the tax returns for small-sized companies or sole proprietorships, which usually have no accounting manpower within the company.

CTAs in Korea usually work as a sole proprietor, or works for tax accounting firms. Most of their duties are tax-related business like sole proprietor CPAs except auditing. In this regard, this study selected CPAs or CTAs, who work as sole proprietors, or work for small accounting/tax firms as respondents.

The second type of the users are the staff accountants in CPA or CTA offices. The staff accountants usually use the e-tax invoice system for their clients, so they can evaluate the mandatory e-tax invoice system. Therefore, this study selected staff accountants in CPA or CTA offices as respondents.

Table 1. Demographic Characteristics

Measures	Items	Frequency
Age	20 - 29	15 (6.3%)
	30 - 39	79 (33.4%)
	40 - 49	93 (39.2%)
	50 - 59	38 (16.0%)
	60 - above	12 (5.1%)
Gender	Male	147 (62.0%)
	Female	90 (38.0%)
Work experience in accounting and tax	Less than 1 year	2 (0.8%)
	More than 1 year - less than 5 years	38 (15.7%)
	More than 5 years - less than 7 years	15(6.2%)
	More than 7 years - less than 10 years	39(16.1%)
	More than 10 years	124(51.2%)
	No response	19(10.0%)

The third type of users are; business owners, or those who work for accounting and tax positions at their companies, or self-employed individuals. They are able to recognize the changes of the tax invoice system in Korea, because they receive a tax invoice from sellers and deliver it to tax preparers. Therefore, the workers in businesses were selected as respondents.

The respondents consisted of CPAs or CTAs (59.9%), staff accountants of CPA or CTA offices (15.2%), and workers in business (24.9%). The number of male respondents was greater than that of female respondents. The ages of the respondents were varied from 23 to 70 years old. Many respondents (124 respondents, 51.2%) worked for the field of accounting and tax for more than 10 years. The number of respondents, whose work experience is less than 1 year, was only 2 (0.8%). Even though this is very tiny portion of all respondents, this study had to include them. This is to find out the success of the Korean e-tax system and critical success factors of the system more objectively from various user's perspectives.

4.2 Research Variables and Questionnaire

This study aims to assess the success of the mandatory e-tax invoice system in Korea, and to find out which actions contributed the most for the success of the system. Therefore, the main variables are "the success of the mandatory e-tax invoice system in Korea", and "the contribution of the major actions, which were introduced when implementing the Korean mandatory e-tax invoice system, on the system success." Additionally, some demographic variables were measured.

4.2.1 Success of the mandatory e-tax invoice system in Korea

The study used multiple items for measuring the success of the Korean mandatory e-tax system. First, this study measured the overall success of the system using three questions; the first question was "Do you think the e-tax invoice system was successfully implemented?" This question is about the users' evaluation of the system's success. After DeLone and McLean [12, 13] suggested a model of information systems' success, many research has been conducted focusing on measuring e-commerce success. Among the variables in DeLone and McLean [13], the 'User Satisfaction' is frequently used to evaluate information system success. For example, Kanellou and Spathis [16] measured user satisfaction to evaluate an ERP system. In an e-commerce environment, users usually have many service providers, so the 'User Satisfaction' can be used as an information success indicator. However, for the evaluation of the information system of the tax authority, using customer satisfaction might not be adequate. Since the users of the system, typically taxpayers, do not have any choices but to use the information system of the tax authority. Thus, instead of using 'User Satisfaction' as an indicator, this study measured and used the users' evaluation of the success of the e-tax invoice system. The second question was "Did the new e-tax invoice system increase the efficiency of your VAT tax return?" For the users of the system, the efficiency in preparing VAT return is very important, so the question on the efficiency is used. The third question was "Do you think the implementation of the e-tax invoice system increase the transaction transparency in Korean business?" When the NTS introduced the e-tax invoice system, one of its goals was "preventing tax invoice fraud." This study used "increasing transaction transparency" instead of "preventing tax invoice fraud," because if the word "fraud" was used, many respondents would tend to response 'ethically,' not to express their real opinion. Also, the NTS usually uses "increasing transparency of transaction" instead of using "preventing tax invoice fraud."

According to the DeLone and McLean's updated model [13], the first question is about the users' evaluation, instead of users' satisfaction. The second question is about net benefits to the user, and the third questions is regarding the net benefits of the tax authority. The net benefits of e-commerce are described as the most important success measures in Delone and McLean's updated model [13]. Using user evaluations and user benefits, the e-tax invoice system can be evaluated from the users' perspective. Additionally, by measuring the "increasing transaction transparency," this study can evaluate the e-tax invoice system from

the tax authority's viewpoint. By including various evaluation variables, this study can evaluate the e-tax invoice system more objectively from various perspectives.

Second, this study measured whether a cost reduction in tax compliance was achieved. The NTS hoped to reduce the cost of tax compliance by implementing the e-tax invoice system. This study measured the tax compliance costs in five categories: 1) tax invoice issuing cost, 2) delivery cost to customers, 3) invoice submitting cost to the NTS, 4) cost for keeping tax invoices, and 5) total tax compliance cost. The changes in these five categories were measured: "how did the following costs change compared with those in years before implementing the e-tax invoice system?" This question can be classified as net benefits of DeLone and McLean's updated model [13].

In summary, this study used eight questions to assess whether the mandatory e-tax invoice system was implemented successfully: three questions regarding the items for measuring the overall successful implementation of the system, and five questions regarding the variables for cost reduction. All variables were measured using a nine-point Likert scale.

4.2.2 Major actions to implement the mandatory e-tax invoice system in Korea

This study also investigated which actions in the mandatory introduction of the e-tax invoice system contributed to its success. Thus, this study assessed whether the major actions, introduced to implement the mandatory e-tax invoice system in Korea, contributed to the system's success. Although the mandatory e-tax invoice system was implemented for corporate taxpayers in 2011, most actions had been introduced since 2010. After selecting the important actions from 2010, this study asked "how did the following actions contribute to the successful implementation of the e-tax invoice system?" All the actions were measured using a nine-point Likert scale. This study selected major 28 actions that had been introduced for the e-tax invoice system from 2010. All the actions were classified into some categories for explanation. The selected 28 actions were as follows:

1) **Preparation period:** The NTS planned to make the e-tax invoice system mandatory for all corporate taxpayers and sole proprietors with supplied value of 1 billion KRW or more in 2010. However, there were severe complaints from taxpayers, so the NTS suspended its implementation for 1 year for corporation and 2 years for sole proprietors. That is, the e-tax invoice system became mandatory for corporate taxpayers from 2011, and for the sole proprietors from 2012. In addition to this preparatory period, the NTS allowed the issuing of e-tax invoices voluntarily in 2010.

2) **Providing tax credit:** The NTS provided tax credit for taxpayers who accepted the mandatory e-tax invoice system

3) **Penalty:** If a taxpayer does not meet the obligations of the mandatory e-tax invoice system, then the NTS imposed many types of penalty.

4) **Providing various issuing systems for diverse taxpayers:** The NTS prepared various issuing systems appropriate for various types of taxpayers, as explained previously. By providing various issuing systems, all taxpayers who must issue and transmit e-tax invoices have been able to do so conveniently.

5) **Taxpayers subject to the e-tax invoice system:** Unlike the e-tax invoice systems of other countries, the NTS implemented the e-tax invoices system for certain sole proprietors. Also taxpayers, who were not subject to the mandatory system, were allowed to issue tax invoices electronically

6) **Transmission time:** Under the paper tax invoice system, tax invoices could be revised for the convenience of taxpayers. However, under the e-tax invoice system, a tax invoice cannot be revised retrospectively without convincing reasons. Also, a tax invoice is

transmitted to the NTS and delivered to purchaser immediately after the e-tax invoice issued. According to Korean VAT law, an issued e-tax invoice must be transmitted to the NTS within 1 day after it was issued. In turn, after implementing the mandatory e-tax invoice system, it became impossible to revise e-tax invoices.

7) **Exemption of some tax reports:** By introducing the e-tax invoice system, some tax reports were exempted, because all information on the tax invoices was transmitted to the NTS.

8) **NTS's efforts to increase usage of the e-tax invoice system:** The NTS took many efforts to increase voluntary use of the e-tax invoice system before implementing the mandatory system

9) **IT environment of Korea:** Korea has the most convenient and highly advanced IT environments in the world. This environment may contribute to the successful implementation of the e-tax invoice system in Korea.

10) **Extension on the range of the mandatory e-tax invoice system:**

This study selected 33 major measures: 28 major actions that were already introduced and 5 actions that will be introduced when implementing the Korean mandatory e-tax invoice system. This study asked for each question that "how did (can) each action contribute to the successful implementation of the Korean e-tax invoice system?" using a nine-point Likert scale.

4.3 Research Procedures

The variables of the questionnaire were prepared from various sources of the Korean e-tax invoice system, such as the NTS reports, articles from newspapers and the internet, and interviews with CPAs and CTAs. After the draft was prepared, some CPAs and CTAs reviewed it, and the questionnaire was revised based on their suggestions. The paper questionnaire was completed first, and then it was converted to a web questionnaire. After revising some problems of a web questionnaire, the questionnaires were available to the respondents from late August in 2013. In total, 237 users responded by late September: 35 CPAs, 107 CTAs, 36 staff accountants, and 59 workers in business.

Table 2. Types of Survey and Respondents

Questionnaire type	Web questionnaire	Paper questionnaire	Total
CPAs/CTAs	141	1	142 (59.9%)
Staff accountants ¹⁾	25	11	36 (15.2%)
Workers in business	27	32	59 (24.9%)
Total	193	44	237 (100.0%)

This study conducted a web-based survey for the first and second types of respondents, and a paper-based survey for the third type. This research selected the email addresses of CPAs and CTAs in Seoul, Korea, randomly from the CPA and CTA membership directories. The instruction for the survey was delivered to the respondent through his/her email address. A respondent accessed the website for the survey (<http://svy.pusku.com/>), and clicked his/her responses. The answers of the respondent were saved into an EXCEL file automatically. To the staff accountants in CPAs and CTAs offices, the instruction was delivered through CPAs or CTAs whom a researcher requested personally. A paper questionnaire was delivered to the third-type of respondents. A paper questionnaire was distributed and collected through the

staff accountants in CPAs or CTAs offices, workers in business. Some third-type respondents were also delivered a web questionnaire through staff accountants in CPAs and CTAs offices.

5. Data Analyses and Results

This study aims to assess whether the mandatory e-tax invoice system was implemented successfully, and to find which actions contributed to the success of the system. Before showing descriptive statistics and hypothesis testing, the study classified the measured variables into a smaller number of groups. After data reduction, data analysis and hypothesis testing were conducted.

5.1 Data Reduction

The study used 8 variables for system success and 33 variables for important actions. Because some variables reflect similar constructs, the variables can be reduced into a smaller number of groups that include similar constructs. Using factor analysis, the variables are grouped into smaller numbers of constructs. First, the success of the system was measured using eight variables. To ascertain the factor structure of the eight variables, the FACTOR routine in SPSS was used. Because the data were not normally distributed, a principal component analysis was used as an extraction technique. An oblique rotation using the OBLIMIN routine was used, because there was no fully detailed theory about the relationships among the eight variables. After the factor analysis, the eight variables were reduced to two factors. According to the guidelines for identifying significant factor loadings based on 237 samples in this study [17], the eight variables were classified into two factors, which have factor loadings of 0.4 and above (Table 3).

The Kaiser Meyer Olkin (KMO) measure of sampling adequacy (MSA) was 0.854 suggesting that factor analysis was appropriate for this data set. Also, the Bartlett's test of Sphericity was significant at the 0.001 level. Therefore, the data set of this study was appropriate for factor analysis. Construct validity was assessed by both convergent and discriminant validity using factor analysis. Overall, the variables of the same factor have higher correlations with the other variables, and have lower correlation with the variables of the other factor. These mean that there are both convergent and discriminant validity of the data and the two factors in Table 3 (Trochim and Donnelly [18]). Reliability was assessed using Cronbach's α . The factors have high Cronbach's α values (0.724, 0.912) indicating high reliability. Based on the variables having higher factor loadings, the two factors were named: Overall success (Factor 2) and Cost reduction (Factor 1). The two factors explain 70.91% of the variance.

Table 3. Data reduction for 8 variables of the success of the e-tax invoice system

Factor name	Variables ¹⁾	Descriptive Statistics		Factors loading ²⁾		Statistics of each factor	
		Mean	Std. Dev.	Factor 1	Factor 2	Cronbach's Alpha	Mean
Overall Success	Overall evaluation	7.12 ³⁾	1.38		.905	0.724	7.12
	Tax filing efficiency	7.36 ⁴⁾	1.31		.791		
	Transparency increase	6.86 ⁵⁾	1.50		.707		
Cost Reduction	Issuing cost	6.07 ⁶⁾	1.94	.831		0.912	6.38
	Deliver cost to customers	6.73 ⁶⁾	1.80	.797			
	Submitting cost to the NTS	6.39 ⁶⁾	1.87	.913			
	Keeping cost	6.60 ⁶⁾	1.88	.860			

	(Q17) Duty to transmit an issued tax invoice to the NTS 1 day after issuing	5.96	2.10								.464		
Tax Credit for issuing e-tax invoice (F3)	(Q4) Providing tax credit for issuing e-tax invoices from the voluntary implementation period (KRW 100 per one issuing)	5.97	2.26			.884						.899	5.83
	(Q5) Providing an appropriate amount of tax credit (currently, KRW 200 per one issuing)	6.05	2.31			.900							
	(Q6) Increase in the tax credit from KRW 100 in 2010 to KRW 200 in 2011 per one e-tax invoice issuance	6.17	2.21			.925							
	(Q7) Setting an appropriate limit on tax credits for issuing e-tax invoices (KRW 1,000,000 per year)	5.13	2.19			.643							
Penalty (F5)	(Q8) Imposing appropriate penalties (such as non- (or delayed) issuing or non- (or delayed) transmission)	6.23	1.93					.754				.833	6.09
	(Q9) Gradual increase in the penalty for non-transmission (none in 2012, 0.1-0.3% of the amount of the e-tax invoice in 2013, and 0.5-1.0% in 2014)	5.95	2.00					.845					
Issuing System of e-tax invoice (F4)	(Q10) Providing various issuing systems (e-sero, ASP, ERP, etc.)	6.71	1.72			.473	.424					.803	7.08
	(Q11) Establishing a free web site (e-sero) for small-sized taxpayers	7.44	1.50			.848							
	(Q12) Implementing systems interconnected with other electronic systems of the NTS (e.g., e-filing system (Hometax))	6.97	1.69			.765							
	(Q13) Implementing the system interconnected with user program, such as EXCEL	7.20	1.59			.692							
Exemption of tax reports (F7)	(Q18) Summary table of tax invoices on sales and purchases are exempted (since 2013).xxd	6.40	1.94							.771		.788	6.88
	(Q19) No obligation to keep tax invoices	6.89	1.85							.818			
	(Q20) Convenience in checking the details of issued tax invoices	7.36	1.54							.719			
Consulting and education by the NTS (F1)	(Q21) Active promotion on the e-tax invoice system to taxpayers	5.90	2.02	.730								.924	5.70
	(Q22) Active education of the users of the e-tax invoice system	5.60	2.15	.799									
	(Q23) Running a website for issuing and transmitting e-tax invoices	6.41	1.90	.614									
	(Q24) Providing perfect data security for the e-tax invoice system	5.90	1.91	.743									
	(Q25) Individual online counseling through the internet	5.16	2.12	.891									
	(Q26) Individual offline counseling through the telephone	5.24	2.10	.869									
IT environment of Korea (F6)	(Q27) High IT tech knowledge and infrastructures of Korea	6.79	1.49					.789				.800	6.79
	(Q28) Daily usage of the internet in Korea	6.80	1.64					.795					

Extension of the mandatory e-tax invoice system (F2)	(Q29) Extending the range of sole proprietors subject to the mandatory e-tax system from 1 billion KRW or more to 0.3 billion KRW or more	6.26	2.22		.843								.912	6.08
	(Q30) Implementing the e-tax invoice system to all taxpayers including all sole proprietors	5.54	2.60		.870									
	(Q31) Allowing only an e-tax invoice, and prohibiting a paper tax invoice	5.78	2.65		.884									
	(Q32) Implementing the mandatory e-tax invoice system to the VAT exempt taxpayers	6.53	2.09		.768									
	(Q33) Extending taxation base, such as abolishing the simplified VAT taxpayers	6.30	2.26		.740									
Eigenvalue				10.22	3.59	2.32	2.08	1.73	1.47	1.16	1.10			
% of Variance explained				30.96	10.87	7.01	6.30	5.24	4.46	3.52	3.33			
Cumulative % of Variance explained				30.96	41.83	48.84	55.14	60.38	64.84	68.36	71.69			

1) Factor loadings less than 0.40 are not shown

2) 1: not contribute at all, 9: significantly contribute

5.2 Correlations

The main purpose of this study is to find which actions, introduced in implementing the mandatory e-tax invoice system successfully, have significant effects on the success of the Korean mandatory e-tax invoice system. By analyzing the relationships between the system success and the actions, the study may find the actions that have significant impacts on the system success. To examine such actions, the correlations between the system success and the actions followed by a regression analysis.

Correlations between variables are shown in [Table 5](#). Most variables are positively correlated with one another, with correlations ranging from 0.142 to 0.532 as Pearson correlations (and from 0.125 to 0.510 in Spearman correlations). All factors (except Cost with F3 in Spearman correlations) have significant correlations with system overall success (Success) and cost reduction (Cost), indicating that all the actions of the mandatory e-tax invoice system may have significant effects on system success and cost reduction.

Table 5. Correlations between variables

Dimension ¹⁾	Success	Cost	F 1	F 2	F 3	F 4	F 5	F 6	F 7	F 8
Success	1	.463***	.415***	.377***	.235***	.444***	.298***	.355***	.421***	.510***
Cost	.453***	1	.375***	.346***	.125	.368***	.197***	.308***	.410***	.293***
F 1	.446***	.358***	1	.217***	.437***	.447***	.299***	.404***	.450***	.500***
F 2	.360***	.361***	.220***	1	.198***	.383***	.428***	.263***	.287***	.286***
F 3	.239***	.142**	.452***	.203***	1	.346***	.220***	.169***	.308***	.470***
F 4	.473***	.378***	.470***	.321***	.334***	1	.373***	.363***	.502***	.420***
F 5	.293***	.223***	.329***	.417***	.209***	.361***	1	.178***	.250***	.476***
F 6	.378***	.303***	.432***	.213***	.180***	.363***	.223***	1	.298***	.259***
F 7	.424***	.428***	.508***	.279***	.318***	.493***	.277***	.319***	1	.387***
F 8	.532***	.287***	.515***	.279***	.462***	.450***	.482***	.312***	.415***	1

1) Factors' names are in [Table 3](#) and [Table 4](#). "Success" is "Overall success," and "Cost" means "Cost reduction" in [Table 3](#).

2) Spearman (Pearson) correlations are above (below) the diagonal

*** Correlation is significant at the 0.01 level (2 tailed), and ** at the 0.05 level (2 tailed)

5.3 Regression Analyses

This study conducted a regression analysis for testing the impacts of the actions on system success (H2). In the regression models, the independent variables are the eight factors that represent the major actions introduced for implementing the mandatory e-tax invoice system. The dependent variables are the two factors measuring system success. A regression was conducted using each dependent variable. First, the results of the overall success of the mandatory e-tax invoice system are shown in **Table 6**. The estimated regression coefficients, t values, and the coefficients of determinant (R²) for each equation in the hypothesized models are presented.

The results of the regression analysis are as follows. First, Factor 2 (F2), Factor 4 (F4), Factor 6 (F6), and Factor 8 (F8) have significant effects on the overall success of the mandatory e-tax invoice system. This indicates that the actions in these factors contributed significantly to the overall success of the mandatory e-tax invoice systems. Thus, if other countries want to introduce a mandatory e-tax invoice system, then the actions in these four factors (F2, F4, F6, and F8) must be emphasized when they implement a system. For example, to implement the mandatory e-tax invoice system successfully, it is necessary to give a preparatory period for taxpayers (F8).

Table 6. Regression for overall success of the e-tax invoice system

Dependent variable ; Overall Success				
Variables	Unstandardized Coefficients B	Standardized Beta	t	Sig.
(Constant)	2.668		6.857	.000
Factor 1 (Consulting and education by the NTS)	.074	.114	1.653	.100
Factor 2 (Extension of the e-tax invoice system)	.102	.184	3.236	.001***
Factor 3 (Tax Credit for issuing e-tax invoice)	-.062	-.109	-1.820	.070
Factor 4 (Issuing System of e tax invoice)	.151	.173	2.713	.007***
Factor 5 (Penalty)	-.055	-.088	-1.434	.153
Factor 6 (IT environment of Korea)	.096	.122	2.127	.034**
Factor 7 (Exemption of tax reports)	.077	.102	1.621	.106
Factor 8 (Preparation Period and Transmission time)	.297	.357	5.256	.000***
Model R ² : 0.426 Adjusted R ² : 0.406 F: 21.184 (Significance: 0.000)				

*** Significant at the 0.01 level (2 tailed), and ** at the 0.05 level (2 tailed)

At the time of initial introduction of the system, it was not easy for taxpayers to issue all tax invoices and to transmit the invoices to the tax administration. In particular, it was difficult for individual taxpayers to accept the e-tax invoice. At the time of initial introduction of the system, it was not easy for taxpayers to issue all tax invoices and to transmit the invoices to the tax administration. In particular, it was difficult for individual taxpayers to accept the e-tax invoice. In Korea, the NTS planned to introduce the e-tax system, but the NTS suspended the introduction by 1 year for corporate taxpayers and 2 years for certain individual taxpayers. By giving such a preparation period (Question 3), the Korean e-tax invoice system could be successfully accepted. Also, mandatory introduction to all corporate taxpayers (Question 2) is needed. In addition, transmitting an issued tax invoice to the NTS immediately (Question 17) is important for successful implementation. The results of this study also indicate that the users

think that the extension of the current e-tax invoice system (F2) can contribute to system success. For example, only e-tax invoices are allowed (Question 31), and the e-tax invoice system should be implemented for all taxpayers, including sole proprietors (Question 30). If all taxpayers issue e-tax invoices, then the e-tax invoice system could be implemented perfectly. Finally, to implement a mandatory e-tax system successfully, it is necessary to provide technical support and to prepare a good IT environment. That is, by preparing various issuing system (F4) and a good IT environment (F6), the NTS could implement the mandatory e-tax invoice system successfully. For example, the tax authority should provide technical support for taxpayers, including a free website for small-sized taxpayers (Question 11) or various issuing systems (Question 10).

Even though the significance is somewhat low, giving tax credit for issuing e-tax invoices (F3, $p = 0.070$) and consulting and education by the NTS (F1, $p = 0.100$) could contribute to the system's success. In contrast, exemption of tax reports (F7, $p = 0.106$) and penalty (F5, $p = 0.153$) did not significantly contribute to the success of the system.

Second, the results of the cost reduction of the mandatory e-tax invoice system are shown in **Table 7**. F2 and F7 have significant effects on cost reduction. Because the actions in F2 and F7 contribute significantly to cost reduction, a tax authority, who wants to reduce tax compliance costs through an e-tax invoice system, may introduce the actions in F2 and F7. That is, by convenience of checking the details of tax invoices (Question 20), and exempting tax reports (Question 18), costs could be reduced. Also, if the e-tax invoice system was extended to all taxpayers (F2), the cost could be decreased too. Additionally, by preparing various issuing systems (F4, $p = 0.079$), and providing consulting and education (F1, $p = 0.088$), the e-tax invoice system could reduce the tax compliance costs. Compared with the results of the overall success in **Table 6**, the number of factors having significant impacts is fewer. This means that many of the actions introduced did not contribute to cost reduction.

Table 7. Regression for cost reduction

Dependent variable : Cost Reduction				
Variables	Unstandardized Coefficients B	Standardized Beta	t	Sig.
(Constant)	1.519		2.494	.013
Factor1 (Consulting and education by the NTS)	.120	.131	1.715	.088
Factor2 (Extension of the e-tax invoice system)	.184	.237	3.750	.000***
Factor3 (Tax Credit for issuing e-tax invoice)	-.088	-.109	-1.642	.102
Factor4 (Issuing System of e tax invoice)	.154	.125	1.766	.079
Factor5 (Penalty)	-.041	-.047	-.695	.488
Factor6 (IT environment of Korea)	.103	.093	1.457	.146
Factor7 (Exemption of tax reports)	.248	.234	3.358	.001***
Factor8 (Preparation Period and Transmission time)	.052	.044	.586	.559
Model R ² : 0.295 Adjusted R ² : 0.270 F: 11.910 (Significance: 0.000)				

*** Significant at the 0.01 level (2-tailed)

5.4 Additional Analysis

Additional analysis is conducted using each variable of overall success in **Table 3**. For the overall evaluation, the results are the same with the overall success (F2, F4, F6, and F8). F4, F5, and F8 have significant impacts on tax filing efficiency. Also, F2 and F8 have significant

effects on transaction transparency. Also, preparation period and transmission time (F8), and extension of the system (F2) could contribute to an increase of transaction transparency. Using these results, the tax administration has to emphasize some specific actions that have significant effects on its desired purposes.

An additional analysis is also conducted for each variable in cost reduction in **Table 7**. The results suggest that some factors have significant effects on each cost reduction variable: F2 on issuing cost, F2, F4, F6, and F7 on delivering cost, F2 and F6 on submitting cost, F2, F3, F4, and F7 on keeping cost, and F1, F2, F3, and F7 on overall tax compliance cost. Using these results, if the tax administration is to reduce each cost related with tax invoices, the tax administration may introduce actions that have significant effects on cost reduction.

6. Conclusion

Many tax authorities around the world have tried to automate their processes using advanced information technology over the Internet. Many countries have introduced e-tax invoice systems, so that a tax invoice can be issued and submitted electronically to the tax authority. Under VAT system, tax invoices are very important as taxation data because they include information on the price and tax of a transaction. While a paper tax invoice was submitted to the tax authority within a certain period of time, an e-tax invoice can be submitted to the tax administration as soon as it is issued. Such e-tax invoices cannot easily be retouched, therefore, they can reduce tax invoice fraud. Additionally, under an e-tax invoice system, real-time tax audits or ex-ante tax audits become possible, while ex-post tax audits are usually conducted with a paper tax invoice system.

Although many countries have already introduced e-tax invoice systems, most countries still allow issuing paper tax invoices. Under such a voluntary e-tax invoice system, e-tax invoices and paper invoices are treated equally, so the benefits of the e-tax invoice system cannot be fully realized. Unlike other countries, the Korea tax authority (NTS) applied a mandatory e-tax invoice system to all corporate taxpayers since 2011. Also, the Korean e-tax invoice system was extended to sole proprietors with the annual sales volumes of more than 1 billion KRW (approximately US\$1,000,000) from 2012.

A growing number of countries legally require e-tax invoices for tax purposes. Since many tax authorities consider a mandatory e-tax invoice system to be more useful than a voluntary system, they would like to change their current voluntary e-tax invoice system to a mandatory system. However, since taxpayers' income could be more easily captured through a mandatory system, it is not easy for the tax authority to introduce a mandatory system. In this regard, by reviewing and evaluating the mandatory e-tax invoice system in Korea, this study can provide various policy implications to other countries in designing their e-tax invoice systems.

The purposes of this study were divided into two issues. First, this study aims to investigate whether the Korean e-tax invoice system has been implemented successfully. Secondly, this study assesses to find out which actions, introduced to implement the e-tax invoice system, actually contributed to the successful implementation of the Korean e-tax invoice system. Where many nations have tried to extend the use of an e-tax invoice system for tax purposes, this study can provide some useful policy implications by finding the actions contributing the successful implementation of a mandatory system.

There have been many studies on technical aspects of accounting information systems including e-tax invoice systems, and much of the technical problems of the e-tax invoice systems have been solved. However, research to date has not considered how to implement an e-tax invoice system more successfully. Thus, for tax administrations trying to implement an

e-tax invoice system successfully, it is more important to find out how to implement the mandatory e-tax invoice system and which actions are needed when introducing a new system. In this regard, this study focuses on tax administration actions rather than technical features of the system, and provide policy implications.

This study conducted a survey of users of the Korean e-tax invoice system. First, this study measured “the success of the mandatory e-tax invoice system in Korea.” The respondents evaluated the Korean mandatory e-tax invoice system to have been implemented successfully. This research measured system success in two factors: overall success and cost reduction. According to means of overall success (7.12, 79.1% of 9 points) and cost reduction (6.38, 70.8% of 9 points), most respondents thought that the mandatory e-tax invoice system had been implemented successfully. On the other hand, in terms of cost reduction (from 6.07 to 6.73) and in transaction transparency increase (6.86, included in overall success), the respondents felt the system was less successfully implemented on such aspects than the other variables. Thus, the Korean e-tax invoice system was evaluated to have been implemented successfully, but it has not fully realized its net benefits, according to DeLone and McLean [13], measured by cost reduction of the current study.

And then, the study assessed “the contribution of the major actions, which were introduced in implementing the mandatory e-tax invoice system of Korea, on system success.” To find out which actions contributed to the successful implementation of the Korean e-tax invoice system, this study conducted a regression analysis between system success and major actions. According to the results, some actions have significant effects on system success. That is, to implement the mandatory e-tax invoice system successfully, it is necessary to give a preparation period for taxpayers. In Korea, the NTS suspended the implementation for 1 year for corporate taxpayers, and 2 years for certain individual taxpayers. By giving such a preparatory period, the Korean e-tax invoice system was more successfully accepted. The mandatory implementation to all corporate taxpayers is also needed for successful implementation. Additionally, the extension of the current mandatory e-tax invoice system may contribute to system success. That is, if only e-tax invoices are allowed, and the e-tax invoice system is implemented to all taxpayers, including all sole proprietors, then a mandatory e-tax invoice system can be more readily implemented. Finally, to implement the mandatory e tax invoice system successfully, it is necessary for the tax authority to give technical support and to prepare a good IT environment. Establishing a free website for small-sized taxpayers and providing various issuing systems for diverse taxpayers are important. Using these results, the tax administrations who want to introduce a mandatory system have to emphasize some specific actions that have significant effects on its desired purposes.

The study also shows the actions that can contribute to cost reductions in tax compliance. According to the results of the regression between cost reduction and major actions, some factors have significant effects on cost reduction. According to the data analysis, if a tax authority wants to reduce tax compliance costs through a mandatory e-tax invoice system, it is necessary to exempt some tax reports that can be prepared automatically with the e-tax invoice system. Also, if the e-tax invoice system is extended to all taxpayers, the cost could be decreased too. By preparing various issuing system, and providing consulting and education, the e-tax invoice system could reduce the costs of taxpayers too. Compared with the results of overall success described previously, the number of factors having significant impacts is fewer. This means that many actions introduced did not contribute to cost reduction. Therefore, if the Korea tax authority is to reduce costs related with tax invoices through the e-tax invoice system, then it should introduce other actions that have not yet been implemented. In addition,

the study recommends that if the tax administrations of other countries seek to reduce tax compliance costs, the tax administrations should force the specific actions which have significant effects on the cost reduction.

Reference

- [1] E-invoicing Platform, Electronic Invoicing in Mexico is now mandatory, effective immediately, 2011. [Article \(CrossRef Link\)](#)
- [2] KPMG, *Obligations Related to the Implementation of E-Invoice and E-Ledger*, 2012. [Article \(CrossRef Link\)](#)
- [3] MAZARS, "Electronic Invoice (E-Invoice) Application," *Turkey Tax Alert*, issue 6, 2013. [Article \(CrossRef Link\)](#)
- [4] TrustWeaver AB, *Tax compliant global electronic invoice lifecycle management*, TrustWeaver AB, 2013. [Article \(CrossRef Link\)](#)
- [5] National Tax Service, *Introduction of Korean Cash Receipt System*, Unpublished manuscript, 2012.
- [6] European e-Business Lab. *European E-Invoicing Guide for SMEs* (2nd ed.), 2011.
- [7] European Union (EU). Directive 2001/115/EC Section 5 Article 232, 2001. [Article \(CrossRef Link\)](#)
- [8] PWC, *A Summary of Korean Corporate and Individual Income taxes 2013*, PKF (UK) LLP, 2012.
- [9] Isabelle Attali, Tom´as Barros, Eric Madelaine, "Parameterized Specification and Verification of the Chilean Electronic Invoices System," in *Proc. of 24th International Conference of the Chilean, Computer Science Society*, pp. 14-25, 2004. [Article \(CrossRef Link\)](#)
- [10] Sukanya Suwisuthikasem, Songsri Tangsripairoj, "E-tax invoice System Using Web Services Technology: A Case Study of the Revenue Department of Thailand," in *Proc. of 9th ACIS International Conference on Software Engineering, Artificial Intelligence, Networking, and Parallel/Distributed Computing*, pp. 937-942, 6-8 Aug. 2008. [Article \(CrossRef Link\)](#)
- [11] Jordan Floropoulos, Charalambos Spathis, Dimitrios Halvatzis, Maria Tsipouridou, "Measuring the success of the Greek Taxation Information System," *International Journal of Information Management*, vol. 30, pp. 47-56, 2010. [Article \(CrossRef Link\)](#)
- [12] A. Parasuraman, Valarie A. Zeithaml, Leonard L. Berry, "A conceptual model of service quality and its implications for future research," *Journal of Marketing*, vol. 49, no. 4, pp. 41-50, 1985. [Article \(CrossRef Link\)](#)
- [13] William H. DeLone, Ephraim R. McLean, "Information system success: the quest for the dependent variable," *Information Systems Research*, vol. 3, no. 1, pp. 60-95, 1992. [Article \(CrossRef Link\)](#)
- [14] William H. DeLone, Ephraim R. McLean, "The DeLone and McLean model of information system success: a ten-year update," *Journal of Management Information Systems*, vol. 19, no. 4, pp. 9-30, 2003. [Article \(CrossRef Link\)](#)
- [15] Kun Change Lee, Melih Kirlidog, Sangjae Lee, Gyoo Gun Lim, "User evaluations of tax filing web sites: A comparative study of South Korea and Turkey," *Online Information Review*, vol. 32, no. 6, pp. 842-859, 2008. [Article \(CrossRef Link\)](#)
- [16] Alexandra Kanellou, Charalambos Spathis, "Accounting benefits and satisfaction in an ERP environment," *International Journal of Accounting Information Management*, vol. 14, pp. 209-234, 2013. [Article \(CrossRef Link\)](#)
- [17] Joseph F. Hair, Jr., William C. Black, Barry J. Babin, Rolph E. Anderson, Ronald L. Tatham, *Multivariate Data Analysis* (7th ed.), Pearson Prentice Hall, 2010.
- [18] William M. K. Trochim, James P. Donnelly, *Research Methods Knowledge Base* (3rd ed.), Thomson, 2007.



Tae Sup Shim received the B. S., M.S. and Ph.D. degrees in Business Administration (concentrated on Accounting) at Yonsei University, South Korea. He is currently a professor in the Graduate School of Science in Taxation at University of Seoul. His current research interests include tax compliance, electronic tax reporting, behavioral tax research, and experimental tax study.



In Kuk Song is a professor in the Department of Management at Dankook University, Suji, South Korea. He has received a B.S. degree, majoring in Computer Science at University of Tennessee. He was also conferred M.S. and D.S. degrees in the field of Information & System Management at George Washington University. His current research interests include Information Strategy, Big Data, and u-Health Services & Strategy. He also served the ICONI 2015 hosted by the Korean Society of Internet Information, as the program chair.