Designing Public Innovations in Public Sector: The Process and Challenges in Taiwanese E-government

Completed Research Paper

Pei-Hua Chen
National Taiwan University, Taiwan
d97725011@ntu.edu.tw

Wei-Ching Feng
National Taiwan University, Taiwan
r99725006@ntu.edu.tw

Seng-Cho T. Chou
National Taiwan University, Taiwan
chou@ntu.edu.tw

ABSTRACT

Researchers have found that a one-sided focus on technology dominates many e-government projects; ICT has been used mainly as a tool to enhance the efficiency and service delivery of the government. In fact, e-government should achieve public innovation goals, such as redesigning information relationships among stakeholders, enhancing citizen participation in the policymaking process, and reinforcing policy enforcement to create public value. These goals are more valuable, but also more complex than the digitization of existing governmental processes. Βeside, only a few projects could achieve the public innovation diffusion goal among many e-government projects. Therefore, this case study focuses on a very important and successful e-government project in Taiwan – the e-invoicing project, by following the development timeline of this 12-year project to understand the reasons of loosing focus and the turning points to achieve the final success. With the results of this case study, this research address four main factors of success in public innovation diffusion: (a) cooperate with the right stakeholder: e-government projects requires intensive cooperation with both public and private organizations, otherwise the change agency has no complete control over its innovation offering; (b) the selection of the right diffusion mode: centralized innovation-diffusion is difficult to overcome the stereotyped perception that citizens hold toward the government, and thus, it is better to implement by a decentralized fashion; (c) the diversity of services: public innovations have an inherently higher complexity than commercial innovations because they intend to serve a diversity of citizens; and (d) assignment of the right change agent for the project: because the burden on the change agent is tremendous, only a few "policy entrepreneurs" can push through the innovation process, despite few material rewards.

Keywords

electronic government (e-government.), electronic invoice (e-invoicing), information communication technology (ICT), public innovation.

INTRODUCTION

Researchers have extensively studied the practice of electronic government (e-government) as a form of innovation in the public sector. To some extent, the palpable successes of e-businesses in the private sector inspire the concept of e-government. The introduction of ICT to public administration operations might have been innovative decades ago, but as technology becomes more ubiquitous and advanced, some relatively straightforward gains from ICT(e.g., process automation and increased efficiency) no longer suffice to constitute a public innovation in e-government.

The challenge lying ahead of e-government practitioners is how to continuously deliver technological, organizational, and institutional innovation to legitimize e-government investments and be more responsive to societal needs(Bekkers, Duivenboden, & Thaens, 2006), which is more of a conceptual than a technological challenge. Future e-government implementations should innovate beyond the current limited mindset where "IT [has been] seen as the end rather than the means…when e-government is seen as an end in itself"(Heeks, 2006).

To counter the potential pitfalls of limiting e-government as a technological instrument to serve citizens merely as customers, researchers suggest including the institutional context of public administration. For example, e-government may also enhance the participation and engagement of citizens in the policymaking process, redesign information relationships between stakeholders, and reinforce policy enforcement to create public value (Navarra & Cornford, 2005). Effectively using ICT to

enable these types of public innovations is more valuable and complex than the digitization of existing governmental processes, and requires further research.

This paper investigates the processes and challenges of ICT-enabled public innovation that concerns e-government initiatives that are broader than institutional digitization efforts. This research uses the e-invoicing project in Taiwan as a case study, which begins as an e-government trend and ends with public innovation trends.

Electronic government (e-government)

E-Government has no standard definition. The concept and practice appeared in the mid-1990s and evolved over time(Mete, 2007). Table 1 shows a summary of some definitions of e-government. Most definitions mentioned the use of ICT with some reference to certain technologies. This study adopts Bekkers and Homburg's (2005) definition of e-government as the use of modern ICT in public administration to redesign information relationships with its relevant stakeholders that creates added value. Stakeholders include citizens, businesses, civil society organizations, public agencies, and civil servants. Most important, the value-added goals of e-government should be aligned with broader public sector reform goals, such as creating a more efficient, effective, transparent, and responsive government; creating public value; facilitating democratic participation; and empowering citizens (Bekkers & Homburg, 2005; Hartley, 2005; Homburg, 2008; Meijer & Thaens, 2010; Navarra & Cornford, 2005).

Research	Definition of E-government
OECD[1](2002)	"The term "e-government" focuses on the use of new information and communication technologies (ICTs) by governments as applied to the full range of government functions. In particular, the networking potential offered by the Internet and related technologies has the potential to transform the structures and operation of government."
Bhatnagar (2004)	"E-government is understood as the use of ICT to promote more efficient and cost-effective government, facilitate more convenient government services, allow greater public access to information and make government more accountable to citizens."
Navarra and Cornford (2005)	"E-government involves the creation, development and interlinking of a variety of social, institutional and technological ecologies to deliver services which are perceived as legitimate, innovative, useful and welfare enhancing."
Bekkers and Homburg (2005)	"We describe e-government as the use of modern information and communication technologies, especially Internet and web technology, by a public organization to support or redefine the existing and/or future(information, communication and transaction) relation with 'stakeholders' in the internal and external environment in order to create added value."
Heeks (2006)	"[E-government is] all use of information technology in the public sector. It covers a broad range of managerial issues: from high-level strategy to detailed tactics; from the technicalities of data flows and process mapping to the politics of e-government."
Homburg (2008)	"[E-government is the] strategic use of ICT, in and around public administrations, for the purpose of creating a 'wired' or 'digital' government. Ideally, a wired government is more focused on and responsive to societal needs, and makes governments more efficient and democratic."

Table 1   Definitions of E-government

ICT-enabled public innovation in e-government

E-government was a technological innovation in its own right when it was first introduced in the public sector. However, a more legitimate goal of e-government is to include continuous modernization initiatives to keep pace with society's progress and needs. Therefore, fostering innovativeness and using ICT to enable public innovation are indispensable to e-government strategy (Bekkers et al., 2006).

The race to employ the latest technology might falsely tie ICT-enabled public innovation to technology adoption. This can originate from the common characteristics of innovations, which are change, novelty, and new combinations of existing

---

[1] Organization for Economic Co-operation and Development , Glossary of Statistical Terms, http://stats.oecd.org/glossary/detail.asp?ID=4752

resources. Although these characteristics are neutral, a unilateral interpretation introduces the misconception that applying technology into an original process equates to ICT innovation.

Meaningful innovations do not simply occur in a technological space. They are specifically created within an institutional context where an organization intends to exercise its influence, impose regulations, redesign the relationships between relevant stakeholders, and create added value(Fichman, 2004; King et al., 1994). ICT is an important enabler of many types of innovations, but the novelty and change inherent in technology adoption should not define and constrain the innovative potential of e-government.

King et al. (1994) described innovation as "[A] process of movement through three overlapping stages: invention, innovation and diffusion(Dosi, 1988; Mansfield, 1968)." Invention, which comes first, is the appearance of a new idea that has economic, organizational, or public value. Innovation lies in using existing resources to implement that invention into a complex reality. Eventually, one must evaluate whether this innovation reaches effective diffusion to realize the intent of invention (King et al., 1994).

Public innovation is desirable because the government needs to increase the responsiveness to public needs and expectations using limited resources(Mulgan & Albury, 2003). ICT, or the e-government policy to use ICT, has great potential in facilitating public innovation. Bekkers et al.(2006) viewed the innovation potential of ICT from three perspectives: technological, organizational, and conceptual.

RESEARCH METHODOLOGY

The research methodology chosen for this research is the case study approach. The study object in the case study research can be an event, a program, or an activity. Case study research examines the subject in full awareness that an in-depth analysis of a real-life phenomenon cannot be separated from the context in which it is embedded. Case study research raises multiple sources of data that converge in a methodological triangulation to answer "how" and "why" questions (Yin, 2009). The case study focuses on only one or a few instances of the phenomenon being studied, and aims to develop a holistic description and an intensive analysis of the case(Creswell, 2007; Swanborn, 2010). This study employs a qualitative case study approach for two reasons: (a) implementing public innovations in e-government is a complex socio-technical interaction, and (b) investigating the processes and outcomes of innovation requires a qualitative, rather than a quantitative, approach.

Researchers provide advice on how to select a key case, a local knowledge case, an outlier case(Thomas, 2011), a single case, or multiple cases(Yin, 2009). The e-invoicing project is first a local knowledge case in the context of Taiwan; it is also a key case because the Taiwanese government has poured vast amounts of time and resources in its development and promotion. Investigating a local case is a timely response to the recent trend in e-government research, where researchers are urged to acknowledge the local character of e-government instead of searching for universal applications. Currently, no comparable ICT-enabled public innovation case exists in Taiwan, with respect to stakeholder complexity and the scale of the distributed information system. As a result, we chose a single case study, using the inception of e-invoicing in 2000 to 2012 as an analytical frame. This study aims to explain the e-invoicing project's current development, explore how it handles multi-stakeholder relationships, and derive implications for future e-government innovations.

CASE DESCRIPTION

Approximately 80 billion uniform invoices are issued every year in Taiwan. Business-to-Customer (B2C) invoices issued through physical stores account for 90% of total invoices issued, and only 6% of that 90% are B2C invoices issued through virtual stores (Table 2). Before the e-invoicing project, businesses must buy uniform invoices from the printing plant of the Ministry of Finance (MOF), or obtain a printing plant-assigned uniform invoice ID and print them by themselves. Business-to-Business (B2B) businesses use triplicate uniform invoices: one is for the seller's accounting, one is the transaction certificate for the buyer, and one is for the business tax declaration. B2C businesses keep duplicate uniform invoices, and the store and the consumer each keep one. Except for uniform invoice-handling costs, the major cost for B2B transactions is the mail cost, whereas B2C has substantial archiving costs. According to Taiwanese taxation law, uniform invoices must be kept for 5 years.

Transaction Types	Number of Uniform Invoices Issued(billion)	Percentage
B2B	8	10%
B2C (physical stores)	67.68	84.6%
B2C (virtual stores)	4.32	5.4%

Total	80	100%

Table 2. Number of Uniform Invoices Issued by Transaction Types

The concept of e-invoicing first appeared with electronic data interexchange (EDI) 30 years ago, but it applied only to large corporations that had vast resources. With the advent of the Internet, the costs for adopting e-invoicing became affordable for smaller companies.

Paper invoice processing is time-intensive, error-prone, and requires substantial manual work for both sellers and buyers. Suppliers must create and distribute invoices, follow-up on relative status and resolve issues, make payments, and report and file taxes. Buyers must keep invoices, verify data, approve accounting and resolve issues, and report and file taxes. Table 3 shows a summary of the advantages of using e-invoicing.

Area	Advantages of e-Invoicing
Process Automation to Overcome Paper Invoice Challenges	reduce error-rate and time for dispute resolution reduce invoice processing cycle increase staff productivity early payment discount opportunities (for buyers) reduced days sales outstanding (for sellers)
Improve Cash Management	increase invoice visibility enhance spend management enhance cash flow
Green Initiatives	reduce print, copy, postage and transportation less physical space required to store and archive invoices less wastes-paper, ink cartridge, etc

Table 3. Advantages of Using e-Invoicing

Uniform invoices are important legal documents exchanged between transacting parties for the filing of business tax in commercial transactions. Additional printing (or buying), handling, mailing, and archiving costs are associated with paper invoices. With the advent of e-business and e-commerce, paper invoices have become increasingly inconvenient for both B2B and B2C businesses wishing to completely digitize their operations. Because of this, the Taiwanese government started promoting e-invoicing in 2000. The 12-year development of the e-invoice project can be segmented into four periods: the pilot phase (2000-2004), the first generation of e-invoicing (2005-2009), the pilot phase of B2C physical stores (2010-2011), and second-generation e-invoicing (2011–present).

The pilot phase (2000– 2004)

During the pilot phase, companies that were undergoing an e-business transformation wanted paper invoices to be digitized as well. Formosa Plastic Corporation and China Steel were representative businesses that advocated the use of e-invoices. In response to their demand, the government promulgated *Regulations Governing the Pilot Phase of Internet-Transferred Uniform Invoices*, which legalized B2B e-invoice transfers: businesses could establish buyer or seller e-invoice value added service centers to exchange e-invoices. If businesses do not have the ability or the need to establish value-added service centers, they can join third-party value-added service centers. The government provided no service support in the pilot phase.

In 2003, the Taxation Agency (TA) commissioned the Institute for Information Industry(III)[2] to research the feasibility of expanding e-invoicing. In 2004, the Financial Data Center (FDC[3]) proposed a 6-year e-invoice promotion project plan.

---

[2] The Institute for Information Industry (III) was incorporated as a non-governmental organization (NGO) through the joint efforts of the public and private sectors to support the development or applications of the information industry, as well as Taiwan's information society. In addition to technological advancement, the III's mission evolved from that of information technology (IT) to that of information and communication technology (ICT) development with a wide social coverage(http://http://web.iii.org.tw/).

The first generation of e-invoicing (2005 – 2009)

During the first generation of e-invoicing, the planning contractor was the III, and the e-invoice platform contractor was MiTAC Information Technology (MiTAC). The planning contractor's role was to help the FDC draft the requirements of the e-invoice platform and supervise the IT contractor. The function of the e-invoice platform was to exchange e-invoices between different value-added service centers to create a more convenient environment for e-invoice users. The FDC operated the platform. B2C virtual stores were legally able to use e-invoices during this phase. Initially, other industries were constrained: online stores were included in August 2005, and catalog and TV shopping were included in October 2007. It was not until September 2009 that regulations allowed all industries to use e-invoices.

The pilot phase of e-invoicing in B2C physical stores (2010–2011)

In March 2010, new members took over the e-invoice promotion team. Because e-invoice promotion to B2B businesses reached a bottleneck, the new team decided to change the promotional strategy to B2C physical stores in December 2010. By introducing e-invoicing to stores hat issued the greatest number of invoices to consumers, the promotion team hoped that the publicity and pervasiveness of e-invoices might influence B2B adoption. Convenience stores (7-11 and Hi-Life), department stores(Shin Kong Mitsukoshi), supermarkets(Pxmart), discount stores(Carrefour), and 3C stores(TsannKuen) participated in the pilot successfully. This changed the processes of how consumers obtain e-invoices (by e-invoice carriers), collect uniform invoice lottery prizes, and donate their e-invoices to non-profit organizations (NPOs). Massive media coverage occurred as expected, but many media reports were negative.

The second generation of e-invoices (2011–present)

During the second generation of e-invoices, the planning contractor was PwC[4] management consulting, and the e-invoice platform contractor was Trade-Van Information Services Co. (Trade-Van[5]). Compared to the capacity of first-generation e-invoicing(2 billion e-invoices), the system design in the second generation can process and store the 80 billion e-invoices that are issued annually. Apart from enabling an e-invoice exchange between value-added service centers, the platform offers personal e-invoice management for consumers as well. The platform became integrated with the Government Budget Accounting Information Management System (GBA) in 2013. The massive quantities of e-invoice data stored on the platform will facilitate future tax inspections and open data initiatives.

In addition to improving the cost efficiency of companies and tax administration, e-invoicing also aims to create public value. For example, it reduces overall paper waste, provides value-added information for policymaking and business opportunities, and facilitates the development of smart commerce (e.g., e-wallet and e-receipts).The e-invoicing project in Taiwan recently won the FutureGov Innovation Award among the Asia-Pacific governments. Several policy documents in Taiwan mention it as a prime example of e-government in the cloud-computing era.

We selected the e-invoicing project as the case study subject because it concerns multiple stakeholders and intends to bring public innovations beyond operational efficiency and customer satisfaction in service delivery. Table 4 shows a summary of how Taiwan's e-invoicing project differs from a typical e-government project.

E-Invoicing is not only about business process automation; from the government perspective, it is also about preventing tax evasion and facilitating an efficient business environment. Because government regulations of e-invoicing and value-added tax compliance differ across countries, they affect national e-invoicing adoption(Trust Weaver, 2011).

This research used secondary data analysis and in-depth interviews as the main data collection methods. Triangulation of data sources and collection methods was applied to ensure credibility. Secondary data contain official documents, regulation, official websites, media reports, and social networking sites that promote e-invoicing. Historical and official data present the

---

[3] The Financial Data Center (FDC) under the Ministry of Finance is expected to serve the goal of offering the public convenient and prompt service by adopting information and communication technology.

[4] PricewaterhouseCoopers (PwC) Taiwan was established in 1970, providing a full range of business advisory service to leading global, national and local companies, as well as to public entities (http://www.pwc.tw).

[5] Trade-Van Information Services Co.(Trade-Van) was established on July 1, 1996; major shareholders include the MOF, among eight leading private corporations. Trade-Van was formed to ensure more effective use of Taiwan's first EDI information exchange network (http://www.itradevan.com).

evolution of the e-invoicing project. Media reports and social networking sites realistically show the promotional tactics of the government and the citizens' responses.

The interviewees for this research were members of the e-invoicing project. They include the following:

● the project leader of the second-generation e-invoice project

● the planning contractor of the second-generation e-invoice project

During the interviews, we inquired about the details of the collaboration and policy dynamics of the project, their interaction with stakeholders, and concerns of important decision making.

	The E-Invoicing Project	Typical E-government Project
Service Provided	Make all processes that include handling the paper uniform invoice more cost-efficient and effective	Make certain public service accessible online or digitize internal processes
Stakeholders Involved	Multiple. The lead public agency, other public organizations, B2B/B2C businesses, consumers and NPOs	Bilateral. The lead public agency staff, service users
Processes Altered	Businesses: printing(buying), handling, issuing and archiving the uniform invoices Consumers: receiving, managing, donating the uniform invoice and collecting the invoice lottery prize Company and government: procurement, accounting and auditing; tax declaration and inspection	Certain public service5or internal process.
Information system	Distributed system. Each individual stakeholder may own/use its invoice management system to interact with the central E-Invoice platform. (e.g, company ERP, smart device app)	Single centralize system hosting by a government agency
Use Case Complexity	(In B2C E-Invoicing) Interactions with multiple physical and online touchpoints to complete the whole process.(e.g., consumers use E-Invoice carriers to receive invoices, collection of the invoice lottery prize)	Interaction with a web portal only
Project Scale	Large (80 billion invoices issued per year; all companies and consumers may become system users.)	Small to medium
Publicity	Becomes the target of public scrutiny because the uniform e-invoice is in citizens' everyday life.	Little to none. Only relevant government staff and service users are affected.
Value	Cost-reduction, efficiency, customer satisfaction, effectiveness of tax inspection, and some public value (e.g., energy savings, value-added information for policy-making and business opportunity; facilitation of the development of smart commerce)	Cost-reduction, efficiency, and customer satisfaction

Table 4. E-Invoicing Project versus a Typical E-government Project

ANALYSIS

In 2000, e-business pioneers addressed the need for e-invoicing, and the Taiwanese government did more than simply legalize e-invoicing in 2005: it established the e-invoice platform. Because the promotion of e-invoicing to B2B businesses reached a bottleneck, the new team changed their promotional strategy by introducing e-invoicing to B2C physical stores in the hope that the publicity and pervasiveness of e-invoicing would influence B2B businesses to adopt it. Only an increase in the number of e-invoices issued would attain all values of e-invoicing. Clarifying the vision of e-invoicing to decide whether the government should intervene also made the second-generation e-invoicing more effective than the first generation.

The e-invoicing project encompassed different levels and types of public innovation. Technological advancement helps envision how products, services, and processes can be improved or created, whereas conceptual innovation helps clarify and

guide their development. When these concrete innovations are created and propagated effectively, they can consolidate into institutional innovation, which forms new relationships among stakeholders. However, the innovation diffusion encounters challenges from the inherent complexity of the public service and the lack of cooperation in G2C relationships.

Many parties (except for tax administration) need a third party to provide them with information systems to adapt to new e-invoice processes. Therefore, the government must provide certain standards and regulations that multi-parties can follow in exchanging e-invoices and developing applications for them.

The system services that value-added service centers provide help businesses integrate e-invoices into their Enterprise resource planning ERP system. The e-invoice platform helps exchange e-invoices between different value-added service centers and store these e-invoice documents for businesses. Consumers may use the stores' e-invoice platform or the official e-invoice platform to manage their e-invoices. The entire lifecycle of a uniform invoice touches on business, financial, taxation, and legal processes. The government plays a major role in the taxation and legal processes; therefore, it cannot leave the promotion of e-invoicing to market mechanisms alone. This leaves the question as to how the government has set strategies and used its policy instruments to promote e-invoicing. This is analyzed as a timeline analysis.

The pilot phase (2000– 2004)

The demand of businesses that were undergoing e-business transformation gave impetus to the e-invoicing project. All that the government had executed was to legalize "Internet transfers" of B2B e-invoices. At that time, buyers, sellers, and third parties established e-invoice value-added service centers without using standardized exchange formats. This showed that no future plan existed to expand e-invoicing to obtain any other value. The government seemed to be merely enabling those who wanted e-invoicing.

In commissioning the III to conduct research on e-invoicing, the government signaled greater interest in promoting e-invoicing. The Executive Yuan[6] expected each ministry to deliver contributing projects because of the proliferation of e-commerce and the global knowledge economy. The main issue that emerged from the III's research on the expansion of e-invoicing was the lack of shared standards in the exchange of e-invoices among value-added service centers. The statistical data on e-invoice users Table 5 reveal that businesses with a strong desire to run e-business assembled their partners to use e-invoicing. They were usually buyers with great bargaining power over their suppliers. Consequently, their trading partners had to handle paper and e-invoices simultaneously, which was entirely inconvenient. Some suppliers were even forced to join different value-added service centers because they conducted business with two or more major buyers.

Types	Number of Businesses that establish(join) value-added service centers	Number of Trading Partners that Used E-Invoice
Buyer Value-added Center	8	1319
Seller Value-added Center	1	81
Seller & Buyer Value-added Center	34	1784
Third-party Value-added Center (5 were established)	6	114

Table 5. Number of Businesses Adopting E-Invoicing (from III report in 2003.11)

The III's research considered ways of expanding e-invoicing to both B2B and B2C businesses. However, it only paid attention to the values of e-commerce, taxation, and e-procurement. The research mostly reflected the viewpoint of businesses and viewed consumers as having a passive role. As a result, the value of energy savings, smart commerce, and value-added information for the government were not viewed as strategic goals.

The first generation of e-invoicing (2005–2009)

Two factors distinguish the first generation of e-invoicing and the pilot phase. First, the FDC started operating the e-invoice platform, and announced the regulations governing B2C businesses using e-invoicing. The function of the e-invoice platform was to exchange e-invoices between different value-added service centers. Second, B2C virtual stores were legalized to use

---

[6] The Executive Yuan is the executive branch of the government of Taiwan.

e-invoices during this phase. (Online stores were included in August 2005, catalog and TV shopping were included in October 2007, and all other industries were included in September 2009.) The e-invoicing platform also provided a basic function of issuing and receiving e-invoices.

Different from the previous pilot phase, the government had a role in promoting e-invoicing. Both the National Tax Administration (NTA) and MiTAC had to promote e-invoicing. The Key Performance Indicators (KPI) consisted of the number of businesses that adopted e-invoicing, of those who use only the e-invoice platform, and not the number of e-invoice issued. This KPI almost made the e-invoice platform compete with value-added service centers; cases exist where the government pled businesses to simply issue one or two e-invoices to attain KPI goal occurred. Because the MiTAC both built and promoted the system, it found itself in a difficult situation. To persuade more businesses to adopt e-invoicing, it had customized the customers' side at the cost of modularity of the e-invoicing platform. (Adverse consequences emerged in the transition from the first to the second generation of the e-invoice platform.)

The deregulation on B2C virtual stores was much demand-led as well. At that time, many online stores (e.g. Pchome) shipped to consumers directly from their suppliers, but online stores issued invoices in other places. Invoices that could not be shipped with purchased items incurred additional mailing costs, which were a considerable cost compared to the price of goods sold online. Catalog and TV shopping faced a similar problem with online stores. Stores selling digital content also wanted to eliminate physical mailing costs, and operated entirely through the Internet as well.(Notably, B2C virtual stores transactions only account for 6% of total B2C transactions.)

For taxation and e-procurement, the government had achieved little to realize the value of e-invoicing. Although e-invoices were stored digitally, the NTA did not change how it inspects tax. Many businesses still printed their e-invoices in case they were inspected for tax purposes. Only some agencies in MOF conducted pilot projects on using e-invoicing in procurement. After receiving e-invoices, they still printed them for related accounting and auditing processes. We may infer the government's attitude toward e-invoicing from this. First, the government did not use its position as a major buyer to promote e-invoicing. Second, e-invoicing was framed only as the "digital transfer of paper invoices"; thus, other processes concerning invoicing were left untouched.

Government-centered thinking became evident in various regulations as well. Businesses needed to submit lengthy applications and pay a security deposit to use the e-invoice platform. The government's rationale was that it would screen only honest companies that use e-invoicing because it assumed that counterfeiting would be easier on electronic forms. The government did not attempt to augment its electronic inspection ability simultaneously, but instead chose to set more barriers. In the end, the companies had even less incentives to adopt e-invoicing.

This analysis shows that the government was in a relatively weak position to promote e-invoicing. Important actions were mostly demand-led; the government did make a great effort to obtain value, such as taxation and e-procurement. Although the government took on part of the responsibility of promoting e-invoicing, its promotional tactics were not well planned. The obscure positioning of the e-invoicing platform and the inappropriate KPI only helped e-invoicing achieve limited goals. It did not expand to include more transactions. All of these factors indicate a reluctant and contradictory government e-invoicing promotion.

Pilot phase of e-invoicing in B2C physical stores (2010–2011)

The bottleneck of B2B invoicing promotion

At the end of first-generation e-invoicing, its promotion reached a standstill. Obstacles to promotion can be inferred from the reports and interviews conducted by the III. However, the costsavingsfrom e-invoicing depend on the industry. For example, online B2C stores had substantially saved on mailing costs because of a greater number of transactions they have, compared to general B2B businesses. However, the e-business maturity of the company determines the benefit it obtains from e-invoicing. The capability to use IT directly influences the perceived adoption costs and resulting benefits to the e-business's operation. Except for those who could save considerably or who wish to be e-business pioneers, a cost-benefit analysis often indicated that for many businesses it was not worth adopting e-invoicing.

The emphasis on cost savings and operational efficiency also meant that promotion became a highly socio-technical issue. If e-invoicing were to simplify accounting processes, the direct saving or benefits would lead to downsizing the accounting department. In promoting the first-generation e-invoices, the NTA and MiTAC often visited financial managers or invited accountants to seminars. With their own jobs at stake, they would not pass the information about e-invoicing to higher management willingly.

The new leader of the e-invoice promotion team, who took up his position from March 2010, made these observations about the B2B e-invoice promotion meeting between NTA and 7-11:

"...we(NTA) had little bargaining power at these kind of meetings. We're almost begging them to use B2B e-invoicing. But what is B2B e-invoicing to them? 7-11 has an entire floor for its accounting department, and they would tell you: "Do I hire them for nothing?" You just can't promote e-invoicing that basically means downsizing the accounting department. This is a strategy issue. I changed the strategy to B2C immediately within a few days. Before, all we talked to were financial managers, and the CEO didn't even know a thing. So, we always got these "Why did you even come here?" expressions from them. Would they tell their bosses(about e-invoicing)? No."

Strategy change: use e-invoicing in B2C physical stores to influence overall e-invoice adoption

After reviewing a request-for-proposal (RFP) document on the second generation of e-invoicing, the new team leader decided to drastically change the promotional strategy. The RFP planned to continue current directions and set the KPI in 2013 to reach 1 billion e-invoices issued. However, he believed that e-invoicing could create more value for businesses and other stakeholders, thus becoming a win-win situation. If the values of e-invoicing are concrete enough, the NTAs no longer have to ask companies to comply with "policy goals."

The new team targeted six major B2C industries to participate in the pilot: convenience stores, supermarkets, discount stores, department stores, fast food chains, and drug stores. In each industry, they negotiated with the top three companies to see whether they wished to participate. The negotiation condition was completely different from what it used to be. The e-invoice promotion team leader said the following:

"I said to 7-11, "I want to promote B2C e-invoicing. I can save you invoice papers, and I won't change your process too much. One invoice paper could save them 10 cents, so 18 billion a year is 1.8 billion NT. Of course they said yes. Furthermore, by making people receive a uniform prize lottery from I-BON (the kiosk machine in 7-11 stores), a prize of $200 adds up to NT$60 billion annually. Who wouldn't want this business opportunity? Do you know who comes to talk to us? The COO. When we went to Shin Kong Mitsukoshi, the Chief Vice President came. Everywhere we went, higher management came to meet us. Higher management sees business opportunities and vision, but accounting people see costs and downsizing. How do you turn this around? It's all about strategy."

"Before, the B2C retailers would think, "Promoting e-invoicing is your(government's) business. I just issued my paper invoices, and everything is fine. If I change to e-invoicing without any cost reduction on consumer invoices, and I have to give all the sales information to you...I'm not that foolish." But we show them how they could achieve both an increase in speed and a decrease in costs by issuing thermal paper e-invoices as a transition. Only one paper e-invoice for the customer, and the other papers are gone."

For B2C physical retailers, the savings from handling and archiving paper invoices are considerable. For benefits, integrating membership cards and e-invoicing is a plus, and e-invoicing could also enable future e-wallet and e-receipt applications. Only by showing concrete values will companies abandon their skepticism.

The new strategy and tactics have changed the government's promotional role from passive to proactive. That only one company could participate in the pilot places a certain competitive pressure on other companies because the first mover had the opportunity to set operational standards for others to follow, and because it was good for the corporate image as well (e.g., Hi-Life, the third biggest convenience store in Taiwan had phoned several times expressing its desire to participate). In the end, 7-11, Hi-Life, Shin Kong Mitsukoshi, and Pxmart participated in the pilot.

The companies originally participated in the pilot proposed a 2-year plan to adopt e-invoicing in all their stores. However, as a result, Shin Kong Mitsukoshi and Pxmart both implemented e-invoicing in all their stores within 3 months. One can infer that the benefit from adopting e-invoicing was effective enough; thus, they chose to implement it sooner. In comparison, 7-11's adoption progress was slower. Because they feared the risks of total adoption, they ran the old POS system and new e-invoicing POS system in parallel; this arrangement did not exhibit the benefits of e-invoicing clearly. However, after they took the promotion team's advice to use only the e-invoicing POS system, they planned to implement e-invoicing in 4,600 stores in 3 months. Notably, these companies received no subsidies; all it had cost the government was negotiation and communication.

In summary, the strategy change is the following: Physical B2C stores account for 85% of paper invoices issued. B2C invoices are ubiquitous in everyday life, and therefore, higher management could see them as well. Once the value of e-invoicing in B2C physical stores is realized and becomes a trend, other companies might review their invoicing processes voluntarily, and consider adopting B2C or B2B e-invoicing.

The second generation of e-invoicing (2011–present)

The second-generation e-invoice platform was different from the first-generation platform in two aspects. First, the first-generation platform was a database for storing invoices as evidence, but the second-generation platform has planned several value-added applications based on e-invoice data. The second difference concerned the positioning of the e-invoice platform. The first-generation platform did not delineate clearly with how the government should promote e-invoicing. A discussion even took place to develop an ERP-like application on the e-invoice platform to attract more businesses.

> *"The uniform invoice is not the backbone of businesses; the backbone of businesses is their ERP system and financial processes. Taxation and legal affairs are less important. But from the government's viewpoint, we only care about taxation on the e-invoice platform. How could we play so many roles?...Our job is to leverage the market mechanism, and to only set necessary regulations and APIs. We shouldn't build an all-mighty total solution on the e-invoice platform." (second generation E-invoice promotion project leader)*

Therefore, the overall e-invoicing system is one e-invoicing platform in addition to many value-added service centers. The e-invoicing platform creates value in taxation, whereas other value-added service centers serve businesses, specifically business domains. Value-added service centers deliver taxation information to the e-invoicing platform, and this helps data exchanges between different value-added service centers.

Apart from using e-invoicing in physical B2C stores to influence overall e-invoice adoption, three other strategies were used for promotion. They were B2Ge-invoicing and a multi channel delivery mechanism for B2B e-invoices. (See Table 6 for the number of businesses using the e-invoice platform and the number of e-invoices issued.)

Business-to-government (B2G) e-Invoicing

Unlike pilot projects in the first generation of e-invoicing, the second-generation e-invoice promotion team aimed to eliminate all paper invoices in procurement and auditing processes. They collaborated with the National Audit Office (NAO) and the Directorate-General of Budget, Accounting and Statistics (DGBAS) to modify the necessary regulations. From July 2012, several agencies in the MOF started e-procurement pilot projects. Meanwhile, the e-invoicing platform implemented the application interface with the Government Budget Accounting Information Management System (GBA). These measures will contribute to governmental e-procurement processes in January 2013.

Stage of Development	Year	Businesses Using the E-Invoice Platform	Number of E-Invoice Issued(billion)
1st Generation of E-Invoice	2006	7	0.0066
	2007	3091	0.17
	2008	11641	0.42
	2009	20576	0.55
The Pilot Phase of E-Invoicing in B2C Physical Stores	2010	28259	1.3
The Pilot Phase &2nd generation of E-Invoice	2011	33594	2
2nd generation of E-Invoice	January,2012 ~May, 2012	35192	8.998 B2C(physical stores) :8.46 B2C(virtual stores):0.45 B2B :0.088

Table 6. Usage of the E-Invoice Platform

Multichannel delivery mechanism for B2B e-invoice

Multichannel delivery aims to solve the problem of buyers not having an e-invoicing capability to receive e-invoices issued from sellers. This used to be a disadvantage in promotion because buyers have less bargaining power to use e-invoicing when sellers refuse to accept e-invoices.

To ease the problem, a function on the first-generation e-invoice platform allowed sellers to use a digital certificate to view e-invoices they received. The second-generation e-invoice platform advanced further by adding e-mail and collected paper e-invoice posts as two additional channels for receiving e-invoices. The best part is that sellers do not have to worry about the e-invoice delivery once they issue the e-invoice on the e-invoice platform. Table 7 presents a summary of the strategic change and outcome in each stage of the development of the e-invoicing project.

Phase	Strategy	Outcome
2000-2004 The Pilot Phase	Let e-business pioneers establish value added-centers to operate B2B E-Invoicing themselves.	70 value-added service centers; 6000 businesses used E-Invoicing
2005-2009 1st Generation of E-Invoice	The MOF implemented the E-Invoice platform to exchange e-invoices between different value-added service centers. B2C E-Invoicing in virtual stores implemented. See E-Invoicing as only electronic transfer of paper invoice, so promoting E-Invoicing in physical B2C stores was not prioritized.	6000 businesses used value-added center service; 20576 businesses used the E-Invoice platform; 0.55 billion e-invoices issued on the E-Invoice
2010-2011 Pilot Phase of E-Invoicing in B2C Physical Stores	Physical B2C stores have the greatest number of invoices issued, so they should not be excluded. The publicity and pervasiveness of the E-Invoice could potentially influence B2B adoption. Six retailing business were targeted: convenience stores, department stores, supermarket, discount stores and 3C stores	33594 businesses used the E-Invoice platform; 2.05 billion e-invoices issued on the E-Invoice platform.
2011-now 2nd generation of E-Invoice	Continue to promote E-Invoicing in B2C and B2B. Utilize B2G E-Invoicing in the e-procurement and auditing to serve good demonstration purpose. Plan more E-Invoicing visions, such tax inspection, open data and smart commerce Goal: 25 billion e-invoices by 2012, 40 billion e-invoices by 2013	35192 businesses used the E-Invoice platform; 8.998 billion e-invoices issued on the E-Invoice platform.(2012.1~2012.6) 5 million (15%) e-invoices are issued to E-Invoice carriers per day.

Table 7. Strategy Change in Development of E-Invoicing

CONCLUSION

Researchers and practitioners have urged practicing e-government as an opportunity for public sector modernization and public innovation. The case of e-invoicing in Taiwan is a prime example that an e-government project might generate more than operational efficiency and public service delivery; ICT can redesign stakeholder relationships to better serve institutional objectives and create public value.

Nevertheless, the inherent complexity of the public service and the lack of cooperation in G2C relationships are identified to be obstacles to public innovation. In the future, we need better citizen participation services that encourageG2C co-creation to steer the direction of e-government policy and projects.

This research is an exploratory study that focused on understanding the process and outcome of one e-government project in Taiwan. More empirical evidence from other e-government projects should complement, verify, and extend the findings in this study.

Current studies one-government have not treated the innovation process and obstacles of e-government implementation comprehensively. There tends to be a one-sided focus on technology, too much optimism about the outcomes of e-government, and an oversimplification of the implementation process of information systems. The e-invoicing project in Taiwan can be viewed as a representative case of Taiwanese e-government. Its 12-year development demonstrates important lessons in designing public innovations for future e-government.

E-invoicing promotion strategy change in 12-years

Initially, the government was not fully engaged in the earlier stages of the development of e-invoicing. It was only passively responding to the emerging need and pressure from pioneering companies in e-commerce and e-business. Without exploring all the potential values of e-invoicing for multiple stakeholders, an emphasis was merely placed on cost reduction and efficiency, which many business owners did not deem sufficiently beneficial. It was not until the strategy change in 2010－ the use e-invoicing in physical B2C stores to influence B2B adoption - that the number of e-invoices issued finally increased. As more e-invoices are issued, the values of taxation, energy savings, and facilitation of the smart consumer lifestyle market become gradually attainable.

E-invoicing as value creation for stakeholders

A digitization project such as e-invoicing has changed business and service processes for multiple stakeholders: businesses, accountants, the tax administration, other government agencies, NPOs, and consumers. These changes were likely to encounter resistance or a conflict of interest among stakeholders and become obstacles of innovation diffusion if not handled smoothly. For example, accounting departments and NPOs, respectively, feared layoffs and worried about reduced invoice donations. To resolve the conflict, the e-invoicing team creatively sought new value for stakeholders and found alternative promotion strategies. The creation of public innovation in e-government requires more communication and negotiation than simply ordering digitization projects in public agencies through a political impetus.

Obstacles to e-invoice promotion

After a more comprehensive design, conflicts among different stakeholders were no longer obstacles for expanding the e-invoicing project. However, insufficient promotion to the public adversely affected the public image of the project, and inefficient cooperation among the ministries slowed the realization of potential values of the project as well.

Challenges of public innovation

Four main challenges were identified in the design, implementation, and diffusion of e-invoicing as a public innovation: (a) cooperate with the right stakeholder: e-government projects requires intensive cooperation with both public and private organizations, otherwise the change agency has no complete control over its innovation offering; (b) the selection of the right diffusion mode: centralized innovation-diffusion is difficult to overcome the stereotyped perception that citizens hold toward the government, and thus, it is better to implement by a decentralized fashion; (c) the diversity of services: public innovations have an inherently higher complexity than commercial innovations because they intend to serve a diversity of citizens; and (d) assignment of the right change agent for the project: because the burden on the change agent is tremendous, only a few "policy entrepreneurs" can push through the innovation process, despite few material rewards.

This analysis indicates that an e-government project may encompass different levels and types of public innovation. It may start from a technology-enabled new policy vision, and advance to the creation of actual products and services that influence related processes. Consequently, the greatest impacts an e-government project may have are to change the relationship between the government and its stakeholders, and possibly modernize public sector organizations.

Three topics for future research stemmed from this study, as follows: (a) The service design challenge of future e-government services deserves further investigation because doing so might ease the difficulties in innovation diffusion (e.g., designing a more convenient B2C e-invoicing user experience for consumers), (b) the mechanism, outcome, and impact of the open data initiatives in the e-invoicing project are worth studying after establishing more use cases; and (c) it is essential to study how citizen participation services and decentralized innovation-diffusion channels may be designed to facilitate more effective public innovations in e-government.

REFERENCES

1. Bekkers, V. J. J. M., Duivenboden, H. v., & Thaens, M. (2006). Information and communication technology and public innovation : assessing the ICT-driven modernization of public administration. Washington, DC: IOS Press.

2. Bekkers, V. J. J. M., & Homburg, V. (2005). The information ecology of e-government : e-government as institutional and technological innovation in public administration. Washington, DC: IOS Press.

3. Bhatnagar, S. C. (2004). E-government : from vision to implementation : a practical guide with case studies. Thousand Oaks, Calif.: Sage.

4. Creswell, J. W. (2007). Qualitative inquiry & research design: choosing among five approaches. Thousand Oaks: Sage Publications.

5. Dosi, G. (1988). Technical change and economic theory. London: Pinter Publishers.

6. Fichman, R. G. (2004). Going beyond the dominant paradigm for information technology innovation research: Emerging concepts and methods. *Journal of the Association for Information Systems*, 5(8), 314-355.

7. Hartley, J. (2005). Innovation in Governance and Public Services: Past and Present. Public Money & Management, 25(1), 27-34. doi: 10.1111/j.1467-9302.2005.00447.x

8. Heeks, R. (2006). Implementing and managing eGovernment : an international text. Thousand Oaks, Calif.: SAGE.

9. Homburg, V. (2008). Understanding E-government: Information systems in public administration: Routledge.

10. King, J. L., Gurbaxani, V., Kraemer, K. L., McFarlan, F. W., Raman, K., & Yap, C. S. (1994). Institutional factors in information technology innovation. *Information systems research*, 5(2), 139-169.

11. Mansfield, E. (1968). Industrial research and technological innovation: An econometric analysis: Norton New York.

12. Meijer, A., & Thaens, M. (2010). Alignment 2.0: Strategic use of new internet technologies in government. *Government Information Quarterly*, 27(2), 113-121. doi: 10.1016/j.giq.2009.12.001

13. Mete, Y. (2007). E-government research: Reviewing the literature, limitations, and ways forward. *Government Information Quarterly*, 24(3), 646-665. doi: 10.1016/j.giq.2007.01.002

14. Mulgan, G., & Albury, D. (2003). Innovation in the Public Sector. London: Cabinet Office Strategy Unit.

15. Navarra, D. D., & Cornford, T. (2005). ICT, innovation and public management: governance, models & alternatives for e-government infrastructures.

16. Swanborn, P. G. (2010). Case study research : what, why and how? Los Angeles, Calif.: Sage Publications.

17. Thomas, G. (2011). How to do your case study : a guide for students and researchers. London: SAGE.

18. Trust Weaver. (2011). Tax-compliant global electronic invoice lifecycle management. Retrieved from http://www.esker.fr/fm/others/001-Esker_WhitePaper_Trustweaver-EU.pdf.

19. Yin, R. K. (2009). Case study research: design and methods. Los Angeles, Calif.: Sage Publications.