Available online at www.sciencedirect.com
SCIENCE DIRECT®
Decision Support Systems 38 (2004) 369–381
Decision Support Systems
www.elsevier.com/locate/dsw

Internet self-efficacy and electronic service acceptance

Meng-Hsiang Hsu*, Chao-Min Chiu

Department of Information Management, National Kaohsiung First University of Science and Technology, Kaohsiung, Taiwan, ROC

Received 21 June 2003; received in revised form 15 August 2003; accepted 16 August 2003
Available online 3 October 2003

Abstract

Internet self-efficacy (ISE), or the beliefs in one's capabilities to organize and execute courses of Internet actions required to produce given attainments, is a potentially important factor to explain the consumers' decisions in e-commerce use, such as e-service. In this study, we introduce two types of ISE (i.e., general Internet self-efficacy and Web-specific self-efficacy) as new factors that reflect the user's behavioral control beliefs in e-service acceptance. Using these two constructs as behavioral control factors, we extend and empirically validate the Theory of Planned Behavior (TPB) for the World Wide Web (WWW) context.

Keywords: Acceptance; E-service; Internet self-efficacy; Theory of planned behavior; World Wide Web

1. Introduction

World Wide Web (WWW) has been the fast growing area of Internet technology in recent years. The explosive growth of WWW has made it a popular platform for electronic services (e-service). Most organizations are migrating to e-services and provide incentives of that over the offline services. Although positive outcomes, such as reducing product search and transaction cost, were the basis for the theories of electronic market [43] and separated online shopper from offline shopper, prior researchers [32,22] found that the desire to use e-service is not sufficient to carry it out. One must also have the perceived ability to complete it. These include establishing and maintaining a stable Internet connection, learning how to navigate on the WWW, and searching it for relevant information.

Internet self-efficacy (ISE), or the belief in one's capabilities to organize and execute courses of Internet actions required to produce given attainments, is a potentially important factor in efforts to use the e-services. This is perhaps not an important issue in offline service environments, where consumers learn how to make purchase at an early stage. However, complexity, knowledge barriers to initial e-service adoption, and comfort and satisfaction issues faced by new users may be construed as Internet self-efficacy deficits [23]. Understanding the acceptance pattern and the role of Internet self-efficacy in e-service adoption constitutes an important research issue.

Recently, Ajzen [3] further extends the Theory of Planned Behavior (TPB) [1,2] by including self-efficacy as a behavioral control variable to deal with situations in which people may lack complete capability to exercise control over the behavior of interest. For researching e-service adoption, this addition is significant because it relates the causal link between Internet self-efficacy and e-service adoption. The theory of

* Corresponding author. Tel.: +886-7-6011000x4117; fax: +886-7-6011042.
E-mail address: mhhsu@ccms.nkfust.edu.tw (M.-H. Hsu).

0167-9236/$ - see front matter © 2003 Elsevier B.V. All rights reserved.
doi:10.1016/j.dss.2003.08.001

planned behavior is well tested in a variety of decision-making area such as marketing-consumer behavior [11], leisure behavior [4], and information technology (IT) ethics [13]. TPB has also been applied to explain an individual's adoption and usage of a new technology (e.g., Refs. [12,35,44,48]). As the TPB [1,2] was conceived to explain and predict the individual's acceptance of IT, its extended model is very well suited to further our understanding of e-service acceptance due to its strong theoretical anchors and its inclusion of self-efficacy.

The goal of the present research is to apply the extended TPB model to the study of e-service (filing income tax through the WWW) acceptance. The contribution of the present study is threefold. First, this study identifies factors that determine users' acceptance of e-service. Second, we examine the nature of ISE and then divide it into two constructs: general ISE (GISE) and Web-specific self-efficacy (WSE). Finally, we examine the causal relationships between the ISE constructs and TPB constructs by using data from a field survey of e-service use.

2. Theoretical background and the research model

2.1. Self-efficacy in information systems

According to Bandura [10], self-efficacy is the belief "in one's capabilities to organize and execute the courses of action required to produce given attainments" (p. 3). Within social cognitive theory [8,10], self-efficacy is a form of self-evaluation that influences decisions about what behaviors to undertake, the amount of effort and persistence put forth when faced with obstacles, and finally, the mastery of the behavior. Thus, people who have low self-efficacy should be less likely to perform related behavior in the future [8], in this case, adopt and use the e-service, than those with high degree of self-efficacy.

Many studies have been conducted to research the impact of self-efficacy on computer-related use. One example of this research stream is the research concentration on the construct of computer self-efficacy (CSE), which was defined as an individual judgment of one's capability to use a computer [17]. An important theoretical property of self-efficacy is that it is concerned not the skills a person has; rather, it reflects what individuals believe they can do with the skills they possess. For example, in discussing CSE, Compeau and Higgins [17] distinguished between component skills such as formatting disks and booting up the computer and behaviors individuals can accomplish with such skills, such as using software to analyze data. Similarly, in discussing Internet self-efficacy (ISE), Eastin and LaRose [23] distinguished between a person's skill at performing specific Internet-related tasks, such as writing HTML, using a browser, or transferring files and his or her ability to apply skill in a more encompassing mode, such as finding information or troubleshooting search problems. Thus, Internet self-efficacy may be distinguished from CSE as the beliefs that one can successfully perform a distinct set of behaviors required to establish, maintain and utilize effectively the Internet and the above basic personal computer skills [23].

Further, self-efficacy researchers emphasized that self-efficacy beliefs should be assessed in such a way that the beliefs correspond to the targeted performance and domain of interest. Recent work in the MIS literature has assessed the level of measure of efficacy construct. By surveying concepts and empirical work related to the concept of self-efficacy, Marakas et al. [33] provided a comprehensive summary of the relevant literature of CSE and draw a distinction between general CSE and task-specific CSE. General CSE represents "an individual's judgment of efficacy across multiple computer application domains... and is more a product of a lifetime of related experiences" (p.129), whereas task-specific CSE refers to "an individual's perception of efficacy in performing specific computer-related tasks within the domain of general computing" (p. 128). Agarwal et al. [6] extended current understanding of self-efficacy in the context of computer software. They made a distinction between general CSE and software-specific self-efficacy (SSE). SSE refers to "individual's feeling of self-efficacy relative to a specific software package" [6].

Similarly, this study distinguishes between the general ISE and Web-specific self-efficacy. General ISE (GISE) refers to "an individual's judgment of efficacy across multiple Internet application domains", whereas Web-specific self-efficacy (WSE) refers to "an individual's perception of efficacy in using a specific WWW application (service) within the domain of general Internet computing". Although the two effica-

cy beliefs are similar, there are several conceptual differences. First, GISE is a trait-oriented efficacy, while WSE is state-oriented. The difference between trait and state efficacy is that the former is a stable cognition that people hold and carry with them, reflecting the expectation that they possess the ability to successfully perform tasks in a variety of achievement situations. Conversely, the latter is a state-based expectation, meaning that it is a judgment about the likelihood of successful task performance measured immediately before any effort is expended on the task. Second, in the context of e-service usage, GISE is developed across time and situations and measured before usage, while WSE is developed through usage and measured after usage. Thus, WSE is much more variable than more enduring notions of GISE.

2.2. Development of the research model

The extended Theory of Planned Behavior (TPB) [3] was chosen as the guiding framework for developing the research model. TPB theorizes that an individual's behavior (i.e., decision) is determined by perceived behavioral control and behavioral intention. Behavioral intention (BI) in turn is jointly determined by attitude toward the behavior (A), subjective norm (SN), and perceived behavioral control (PBC). Recently, Ajzen [3] extended the TPB by suggesting that the measure of perceived behavioral control should contain items that assess self-efficacy as well as controllability. Ajzen' extended TPB is particularly suited for the current work since it is specially geared to explain/understand the role of self-efficacy on the volitional behavior such as e-service adoption. Also, TPB has been successfully applied to investigate the adoption and usage of IT. This study presents the research model that extends the TPB to the study of e-service acceptance (see Fig. 1). The rationale for the factors and the relationships among the factors are described in the following sections.

As hypothesized in the model, intentions are assumed to influence the behavior. Evidence concerning the relation between intentions and behavior has been collected with respect to IT usage and acceptance, with much of the work done in the framework of the TRA, TPB, and TAM. Davis et al. [20] showed that intention

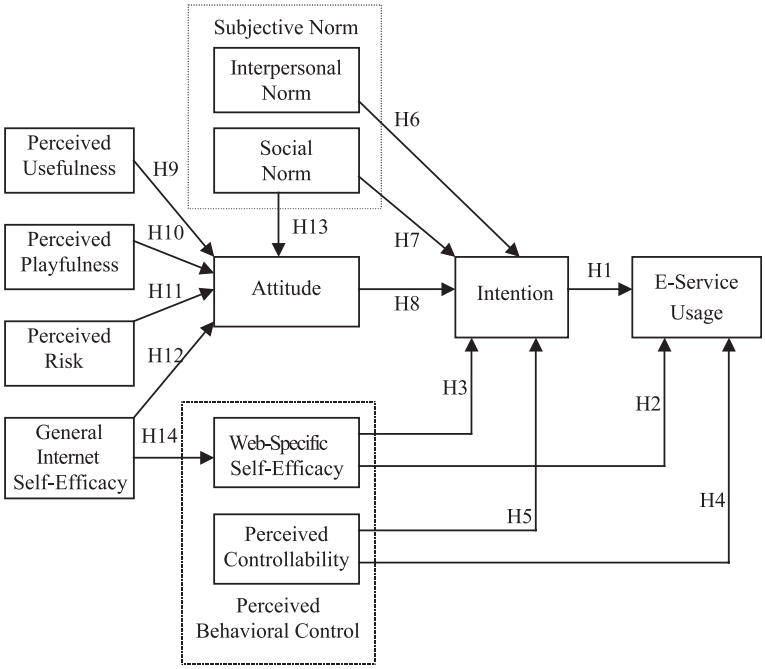

Fig. 1. Research model for E-service acceptance.

to use a word processor was a major determinant of usage behavior. Intention-behavior correlations were 0.35 immediately after a 1-h introduction to the software and 0.63 at the end of the semester (14 weeks later). Chen et al. [15] showed that a consumer's behavioral intention to use a virtual store was a significant predictor of his or her actual use of the virtual store. Therefore, the following hypothesis is proposed.

H1: Behavioral intention to use the e-service will have a positive effect on the service usage.

Prior studies provided support for the relationship between computer self-efficacy and decisions involving computer usage and adoption [17,18,20,27,28]. Joo et al. [30] found that Internet self-efficacy was able to predict students' performance on search task in Web-based instruction (WBI). Eastin and LaRose [23] showed that ISE was positively related to Internet usage in the context of Digital Divide. Eastin [22] performed an analysis of the adoption of four e-commerce activities. Internet self-efficacy was only found to predict one of the four activities, i.e., online shopping. However, he suggested that task-specific self-efficacy could be considered a new variable in the adoption process. Thompson et al. [46] showed that task-specific ISE had a significant effect on online search performance. Another research on computer self-efficacy also indicated that a significant positive relationship between software-specific self-efficacy and software usage [6]. E-service usage and Web-specific self-efficacy should be directly related since we are more likely to attempt and persist in behavior that we feel capable of performing. Therefore, the following hypothesis is proposed.

H2: Web-specific self-efficacy will have a positive effect on e-service use.

H3: Web-specific self-efficacy will have a positive effect on intention to use the e-service.

In an application of TPB to the study of academic achievement, Manstaed and van Eekelen [34] indicated that perceived controllability was a significant predicator of intention in one of the three courses, i.e., English. Armitage et al. [7] extended the TPB to examine the roles of self-efficacy and perceived control over behavior (controllability) in predicting legal and illegal drug use intentions and behavior. Findings revealed that perceived control over behavior played an important role in predicting the cannabis use intentions. Therefore, the following hypotheses are proposed.

H4: Perceived controllability over using the e-service will have a positive effect on the service usage.

H5: Perceived controllability over using the e-service will have a positive effect on intention to use the service.

In the last decade, some studies suggested that the measures of subjective norm should consider two types of normative influences. Subjective norm refers to "the perceived social pressure to perform or not to perform the behavior" [2]. According to innovation diffusion theory (IDT) [41], users will tend to increase communication with referent others to interpret the IT adoption. These increased interactions with the social network may influence their adoption decision. Therefore, Rogers [42] categorized communication channels as interpersonal or mass media in nature. Interpersonal channels involve "a face-to-face exchange between two or more individuals", while mass media channels are "means of transmitting messages involving a mass medium such as radio, television, newspapers, and so on". Karahanna et al. [31] described two types of social influence: (1) informational influence, when individuals accept information as evidence of reality, and (2) normative influence, when individuals conform to expectations of others. Bhattacherjee [12] have viewed subjective norm as including two forms of influence: interpersonal and external. External influence refers to "mass media reports, expert opinions, and other non-personal information considered by individuals in performing a behavior", while interpersonal influence refers to "influence by friends, family members, colleagues, superiors, and experienced individuals known to the potential adopter" [12]. Consistent with prior works, the measure of subjective norm in the research model contains items that assess interpersonal norm (interpersonal influence) as well as social norm (external influence) concerning the e-service. Therefore, the following hypothesis is proposed.

H6: Interpersonal norm concerning the e-service will have a positive effect on intention to use the service.

H7: Social norm concerning the e-service will have a positive effect on intention to use the service.

Prior research provides evidence for the notion that attitudes have a significant impact on intentions in the context of IT adoption and usage [5,14,20,44]. Attitude toward the behavior refers to the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question [2]. Bhattacherjee [12] showed that attitude was a significant determinant of intention to use electronic brokerage services. Attitude explained about 23% of variance in intention to use electronic brokerage services. Chen et al. [15] indicated that a consumer's attitude toward using a virtual store was a dominant predictor of his or her behavioral intention to use the virtual store. Therefore, the following hypothesis is proposed.

H8: Attitude toward the e-service usage will have a positive effect on intention to use the e-file service.

Furthermore, attitudes are estimates that a behavior will produce particular outcomes [38] but depend on many social–economic motivational factors. Based on motivation theories, social–economic factor have been classified into two categories: extrinsic motivation and intrinsic motivation. Extrinsic motivation refers to the performance of an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself. Intrinsic motivation refers to the performance of an activity for no apparent reinforcement other than the process of performing it [21]. Perceived usefulness [19] and perceived risk [29,39] are extrinsic motivational factors concerning positive and negative consequences of using the IT, and thus this study identifies them as economic factors affecting the attitude toward using the e-file service. Perceived playfulness reflects an individual's intrinsic belief in IT acceptance [45], and thus Moon and Kim [36] identified it as a noneconomic factor affecting the attitude.

H9: Perceived usefulness of the e-service will have a positive effect on attitude toward the e-service usage.

H10: Perceived playfulness of the e-service will have a positive effect on attitude toward the e-service usage.

H11: Perceived level of risk of the e-service will have a negative effect on attitude toward the e-service usage.

This study also includes the path from social norm to attitude because studies of Internet services have shown that attitudes toward the service are developed in social networks and are affected by social norms concerning the service [40]. Furthermore, self-efficacy judgments are also related to attitude toward the behavior. Attitude toward the behavior reflects one's favorable/unfavorable feelings of behavioral outcome. Oliver and Shapiro [38] found that the stronger a person's self-efficacy beliefs, the more likely he or she was try to achieve the desired outcome. In the present context this means that Internet self-efficacy should be positively related to the attitude toward the e-service usage, such as WWW service. Therefore, the following hypothesis is proposed.

H12: General Internet self-efficacy will have a positive effect on attitude toward using the e-service.

H13: Social norm concerning the e-service will have a positive effect on attitude toward using the e-service.

Finally, Bandura [10] pointed out that although efficacy judgments are idiosyncratic to particular domains, perceived efficacy will tend to transfer across two tasks within the same domain based on the extent of similarity between the qualitative features of the two tasks and the skill they require. For example, familiarity with an e-service usage should increase an individual's belief in his/her capability to use another e-service usage, i.e., specific Internet efficacy is likely to exhibit carryover effects. Thus within the domain of computing, Marakas et al. [33] suggested that general self-efficacy contributes to the shape of an individual's task-specific self-efficacy. Agarwal et al. [6] also suggested that it is expected that prior efficacy with regard to general software would have a cumulative effect on subsequent software-specific self-efficacy assessments [6]. Therefore, the following hypothesis is proposed.

H14: General ISE will have a positive effect on Web-specific self-efficacy.

3. Research methodology

3.1. Sample and procedure

A pretest of the questionnaire (including all constructs) was conducted using 10 experts in the IS research area to assess logical consistencies, ease of understanding, sequence of items, and task relevance. Overall, the experts indicated that the questionnaire

was relatively clear and easy to compete. A number of suggestions were made concerning the wording of several items and the overall structure of the questionnaire, and these suggestions were incorporated into the revised instrument. Furthermore, a pilot study involving 30 part-time MBA students was also conducted. The purpose of the pilot study was to gain additional feedback about the questionnaire instrument. Respondents were asked to provide any comments on the questionnaire content and structure.

The goal of this study is to investigate individual's intention and behavior in filing income tax through the WWW. To avoid the causality compounded by the retrospective recall triggered by the survey questionnaires, questionnaires were administered to subjects at three phases. First, subjects were given a demo of the e-file service to familiarize them with the use of the e-file service. Questionnaires containing demographic questions and items for measuring general Internet self-efficacy (GISE) were administered to subjects at the beginning of the demonstration session, with an explanation for the purpose and importance of the study. All respondents were guaranteed confidentiality of individual responses. In order to maximize the response rate, a small gift was provided with the survey. After the demo, questionnaires containing items for measuring interpersonal norm, social norm, perceived usefulness, perceived risk, perceived playfulness, Web-specific self-efficacy (WSE), attitude, perceived controllability, and intention were administered to subjects. Finally, questionnaires containing an item for measuring whether the subject used the service to file tax were administered to subjects 2 weeks after the deadline of tax filing. A follow-up e-mail was sent to individuals not having responded to the final questionnaire 2 weeks later.

A total of 400 surveys were sent to the part-time MBA students of a university in Taiwan. A total of 276 surveys were returned. The exclusion of responses from incomplete questionnaires resulted in a total of 239 usable questionnaires (a net response rate of 60%). Table 1 summarizes the demographic profile of respondents.

Table 1
Demographics ($N = 239$)

Demographic characteristics	
Age	mean = 34.97, S.D. = 6.97, range = 21 – 56
Gender	male = 54%, female = 46%
Major	
IS-related	32%
Others	68%
Years of work experience	mean = 10.73, S.D. = 6.89, range = 1 – 31
Years of computer experience	mean = 4.87, S.D. = 2.87, range = 1 – 16

3.2. Instrument

Table 2 lists the instruments for the research construct. The measures for perceived usefulness, attitude toward the usage, behavioral intention, and actual use were adapted from Davis' study. Items for interpersonal norm and social norm were adapted from Bhattacherjee [12]. Items for measuring perceived risk was adapted from Featherman and Pavlou [24]. Items for measuring perceived playfulness was adapted from Igbaria and Iivari [28], which was assessed using four items. Items for measuring perceived controllability were adapted from Armitage et al. [7]. For the aforementioned measures, a 7-point Likert type was used, with anchors ranging from strongly disagree (1) to strongly agree (7).

The measures for general Internet self-efficacy and Web-specific self-efficacy were based on existing research on Internet self-efficacy and social cognitive theory [10]. Several measures exist to evaluate Internet self-efficacy in terms of overall attainments and for Internet use in general [23,47]. Eastin and LaRose [23] developed an eight-item measure of Internet self-efficacy. A major limitation of their scale is that it did not incorporate items for measuring browsing, message exchange, query and search, and file transfer. Joo et al. [30] developed a 13-item ISE scale to assess perceived capability to use the Internet. Torkzadeh and Van Dyke [47] developed a three-factor 17-item instrument for measuring Internet self-efficacy in terms of surfing/browsing, encryption/decryption, and system manipulation. However, their ISE instrument had some limitations [47]: (1) some aspects of the WWW usage were not represented in the instrument (e.g., downloading software and positing to news group), (2) a few items might not be specific only to the Internet domain (e.g., sending a fax), and (3) some elements of Internet usage might be over represented in the scale (e.g., encrypt/decrypt e-mail). Therefore, the present

Table 2
Summary of measurement scales

Intention: composite reliability = 0.96

	Mean	S.D.	Loading
I will experiment with the e-file service and then decide whether or not to use it in the future.	5.21	1.33	0.94
I intend to use the e-file service in the future.	5.13	1.42	0.96
I will use the e-file service in the future.	5.00	1.38	0.90

Attitude: composite reliability = 0.85

	Mean	S.D.	Loading
My decision to use the e-file service was a good idea.	4.92	1.19	0.88
My decision to use the e-file service was a wise one.	5.02	1.27	0.95
My feeling with using the e-file service was better than manual tax filing.	5.12	1.24	0.88

Interpersonal norm: composite reliability = 0.83

	Mean	S.D.	Factor loading
My family thought I should use the e-file service.	4.29	1.16	0.64
My colleagues thought I should use the e-file service.	4.26	1.19	0.78
My friends thought I should use the e-file service.	4.21	1.09	0.77
People I knew thought that using the e-file service was a good idea.	4.63	1.22	0.54

Social norm: composite reliability = 0.78

	Mean	S.D.	Factor loading
I read/saw news reports that using the e-file service was a good way of filing tax.	5.04	1.15	0.61
The popular press depicted a positive sentiment for using the e-file service.	4.77	1.22	0.60
Mass media reports convinced me to use the e-file service.	4.62	1.37	0.61
Expert opinions depicted a positive sentiment for using the e-file service.	4.24	1.48	0.63

Perceived usefulness: composite reliability = 0.89

	Mean	S.D.	Loading
Using the e-file service can improve my tax filing performance.	5.48	1.40	0.84
Using the e-file service can increase my tax filing effectiveness.	5.36	1.30	0.83
Using the e-file service can simplify the tax filing process.	4.89	1.48	0.74

Table 2 (*continued*)

Perceived risk: composite reliability = 0.74

	Mean	S.D.	Loading
There is possibility of the e-file service malfunctioning and not performing as it was designed and therefore failing to deliver the desired benefits.	4.90	1.45	0.75
There might be potential monetary outlay associated with using the e-file service.	3.09	1.54	0.77
There is possibility of losing time when making an unsuccessful tax filing process by wasting time refilling tax.	2.39	1.22	0.72

Perceived playfulness: composite reliability = 0.94

	Mean	S.D.	Loading
I think using the e-file service is interesting.	4.65	1.40	0.75
I think using the e-file service is enjoyable.	4.20	1.42	0.90
I think using the e-file service is exciting.	4.29	1.44	0.90
I think using the e-file service is fun.	4.27	1.42	0.85

Perceived controllability: composite reliability = 0.62

	Mean	S.D.	Loading
Whether or not I file tax through the e-file service is entirely up to me.	6.34	4.69	0.62
How much personal control do you feel you have over filing tax through the e-file service? (very little control/ complete control)	6.21	1.12	0.62
How much do you feel that whether you file tax through the e-file service is beyond your control? (not at all/very much so)	2.67	1.64	0.60

Web-specific self-efficacy: composite reliability = 0.97

	Mean	S.D.	Loading
I feel confident completing the task of filing income tax through the WWW.	8.32	2.00	0.78
I feel confident connecting to the Internet through a modem, ADSL, etc.	8.51	2.03	0.60
I feel confident visiting the Web site for filing income tax by entering its address (URL) in the browser.	8.61	1.89	0.81
I feel confident navigating the e-file Web site by following hyperlinks.	8.66	1.93	0.79
I feel confident finding information about the IRS Web site by using a search engine.	8.55	1.94	0.81
I feel confident finding information about the IRS Web site in a Web directory or portal site.	8.43	1.96	0.78
I feel confident downloading software and data on the Web, e.g., certificate and software for filing income tax.	8.35	1.97	0.85

(continued on next page)

Table 2 (*continued*)

Web-specific self-efficacy: composite reliability = 0.97			
	Mean	S.D.	Loading
I feel confident installing an application or software, e.g., software for filing income tax.	8.03	2.28	0.76
I feel confident receiving an e-mail message containing the certificate data from the certificate authority.	8.26	2.16	0.85
I feel confident filling out a Web form to apply for a secretary key.	8.02	2.33	0.80
I feel confident filling out and submitting the forms for filing income tax.	8.47	1.99	0.85
Internet self-efficacy: composite reliability = 0.97			
	Mean	S.D.	Loading
I feel confident navigating the World Wide Web by following hyperlinks.	8.35	2.14	0.71
I feel confident visiting a Web site by entering its address (URL) in the browser.	8.46	2.02	0.73
I feel confident going backward and forward to previously visited Web pages without being lost in the hyperspace (cyberspace).	8.34	1.87	0.75
I feel confident finding information by using a search engine.	8.02	1.93	0.87
I feel confident finding information in a Web directory or portal.	7.83	1.98	0.77
I feel confident looking for information by querying a Web database.	8.37	1.98	0.78
I feel confident receiving e-mail messages.	8.74	1.75	0.79
I feel confident sending e-mail messages.	8.88	1.67	0.89
I feel confident saving the files attached to e-mail.	8.80	1.72	0.89
I feel confident attaching files to e-mail.	8.70	1.88	0.84
I feel confident posting messages in a Web bulletin board.	7.83	2.37	0.82
I feel confident exchanging messages with other users in discussing forums.	7.53	2.44	0.87
I feel confident chatting on the WWW.	7.38	2.59	0.81
I feel confident downloading files and software.	8.15	2.16	0.84
I feel confident uploading files to a Web site or FTP site.	7.69	2.30	0.80
I feel confident connecting to the Internet through a modem, ADSL, etc.	8.05	2.31	0.67
I feel confident creating a Web page for the World Wide Web.	7.92	2.27	0.86
I feel confident filling out and submitting Web forms.	6.48	2.86	0.74
I feel confident installing an application or software.	7.78	2.35	0.77

GISE scale was adapted from the Torkzadeh and Van Dyke's ISE instrument [47] by considering its limitations and the processes involved in the WWW applications. E-commerce activities on the Web can be classified into four broad categories: online retailing, content aggregating, service providing, and brokerage. Each of the Internet/WWW business applications (services) requires a series of processes for users to complete the e-commerce behavior (e.g., buying goods or accessing information). The present study identifies 19 general processes that users usually perform during the online activities on the WWW. Furthermore, the present Web-specific self-efficacy (WSE) measure was adapted from the GISE measure to fit into the context of filing income tax through the Web.

4. Data analysis

The test of the measurement model includes the estimation of internal consistency and the convergent and discriminant validity of the instrument items. Table 2 shows that all reliability measures were well above the recommended level of 0.70, thus indicating adequate internal consistency [37]. Convergent validity is demonstrated when items load highly (loading>0.50) on their associated factors. Table 2 shows that all of the measures have significant loadings that load much higher than suggested threshold. Convergent validity also is adequate when constructs have an Average Variance Extracted (AVE) of at least 0.50 [25]. Table 3 shows that all AVE were well above the recommended value level of 0.50. For satisfactory discriminant validity, the AVE from the construct should be greater than the variance shared between the construct and other constructs in the model [16]. Table 3 lists the correlation matrix, with correlations among constructs and the square root of AVE on the diagonal.

The test of structural model was performed using the LISREL procedure, a software package designed to perform structural equations model approach to path analysis. The test of the structural model includes (1) estimating the goodness of fit indices, which indicates how well the model is performing, (2) estimating the path coefficients, which indicate the strengths of the relationships between the dependent variables and independent variables, and (3) the R^2 value, which

Table 3
Correlations of latent variables

	EUSE	INT	PERN	SOCN	ATTI	WSE	PCON	PUSE	PRIS	PPLA	GISE
EUSE	0.74										
INT	0.389	0.78									
PERN	0.316	0.126	0.76								
SOCN	0.223	0.462	0.033	0.69							
ATTI	0.514	0.503	0.373	0.516	0.84						
WSE	0.58	0.355	0.535	0.148	0.237	0.82					
PCON	0.675	0.346	0.525	0.019	0.556	0.198	0.64				
PUSE	0.608	0.441	0.174	0.158	0.019	0.776	0.266	0.80			
PRIS	− 0.246	− 0.031	− 0.698	− 0.106	− 0.487	− 0.791	− 0.698	− 0.457	− 0.77		
PPLA	0.447	0.025	0.078	0.367	0.166	0.054	0.055	0.207	− 0.136	0.76	
GISE	0.845	0.232	0.467	0.021	0.333	0.094	0.739	0.545	− 0.371	0.232	0.82

Diagonal elements are the square root of Average Variance Extracted. These values should exceed the inter-construct correlations for adequate discriminant validity.
EUSE = e-service usage; INT = intention; PERN = interpersonal norm; SOCN = social norm; ATTI = attitude; WSE = Web-specific self-efficacy; PCON = perceived controllability; PUSE = perceived usefulness; PRIS = perceived risk PPLA = perceived playfulness; GISE = general Internet self-efficacy.

represents the amount of variance explained by the independent variables.

Goodness of fit indices for the research model is presented in Fig. 2. For models with good fit, χ^2/df should be less than 5.0, GFI, NFI, NNFI, and CFI should exceed 0.90. Fig. 2 shows that the research model of the present study provides a very good fit to the data. The χ^2/df was 2.25, which was well below

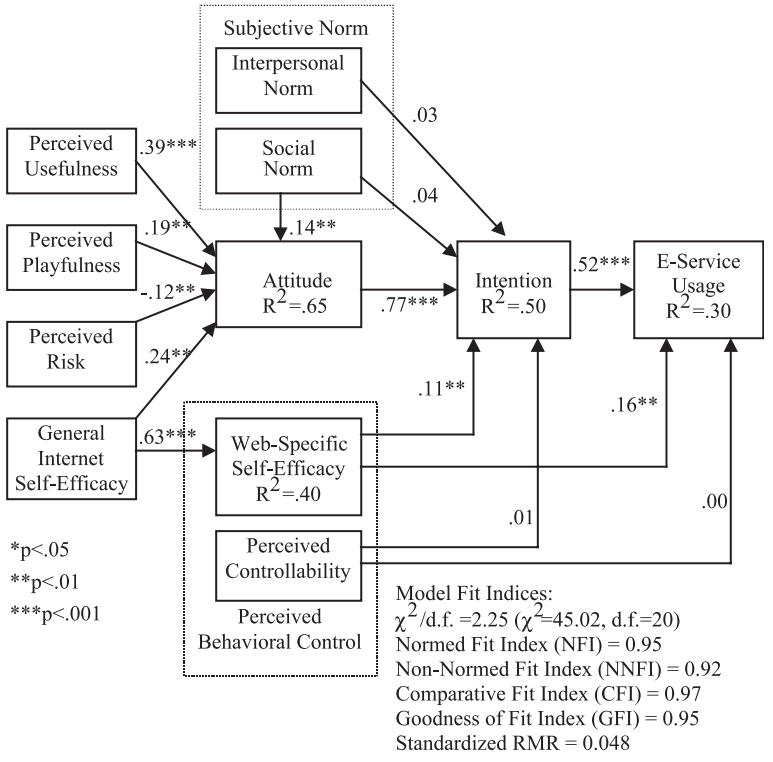

Fig. 2. SEM analysis of the research model.

the recommended value level of 5.0. The remaining four indices (NFI = 0.95, GFI = 0.95, NNFI = 0.92, and CFI = 0.97) were well above the recommended level of 0.90, thus indicating an acceptable fit between model and data.

The standardized path coefficients for research model are presented in Fig. 2. As hypothesized, intention and Web-specific self-efficacy had a positive effect on e-service usage, with path coefficients of 0.52 and 0.16. Hypotheses 1 and 2 were supported. Against expectations, perceived controllability had no effect on e-service usage. Hypothesis 4 was not supported. The constructs explained 30% of the variance contained in e-service usage.

Consistent with Hypotheses 3 and 8, attitude and Web-specific self-efficacy were associated with intention, with path coefficients of 0.77 and 0.11. However, interpersonal norm, social norm, and perceived controllability had no effect on intention. Hypotheses 57 were not supported. The constructs explained 50% of the variance contained in intention to use the e-service.

Social norm, perceived usefulness, perceived playfulness, perceived risk, and general Internet self-efficacy contributed to attitude toward using the e-service. These factors had path coefficients of 0.14, 0.39, 0.19−0.12, and 0.63. They explained 65% of the variance. Hypotheses 9−13 were supported. Finally, consistent with Hypothesis 14, general Internet self-efficacy had a positive effect on Web-specific self-efficacy, with a path coefficient of 0.63.

5. Discussion and conclusions

The goal of the present study was to empirically extend current understanding about the concept of self-efficacy in the context of e-service. In particular, we provided an empirical test of the differential effects of two alternative forms of self-efficacy: general Internet self-efficacy (GISE) and Web-specific self-efficacy (WSE). Overall, this study provides support for the conceptual research model and 10 of the 14 hypotheses as depicted in Fig. 1.

The results of this study provide support for the Social Cognitive Theory (SCT) perspective on e-service behavior on the WWW. GISE and WSE were found to play important roles in shaping individual behavior. Consistent with prior studies arguing that self-efficacy is an important determinant of behavioral intentions, our study found that the relationship between WSE and behavioral intention was significant. The result indicated that GISE had a significant influence on attitude toward the e-service usage. Consistent with the study examining the relationship between general computer self-efficacy and task-specific computer self-efficacy [33], the present study confirmed that GISE contributed to the shape of an individual's WSE. The result also showed that WSE had a significant direct effect on e-service usage, whereas GISE had an indirect effect on e-service usage through WSE, attitude, and intention.

The path from perceived controllability to behavioral intention and e-service usage were not significant. A plausible explanation is that the government allowed individuals to choose filing tax through the e-file or brick-and-mortar service, and thus individuals had full volitional control over their behaviors. Under the condition of full volitional control, an individual's intention and behavior will not be directed by his/her perceived controllability.

Additionally, consistent with the study examining the relationships among attitude, behavioral intention, and actual usage of a virtual store [15], the present study confirmed that attitude toward the e-service usage was the major determinant of behavioral intention, which in turn was the major determinant of e-service usage. Our findings are also consistent with Davis et al.'s [20] observation that people form intentions to perform behaviors toward which they have positive affect. The typical formulation in e-commerce decision confirms that people's e-service usage is influenced by their outcome evaluations (attitude), while these evaluations in turn influence their intentions.

Inconsistent with our hypothesis, this study found that interpersonal norm and social norm did not have a significant direct effect on behavioral intention. It means that consumers' decisions in e-service usage are not influenced by important referents and mass media. A possible explanation is that that the implementation of the e-file service has past the early stage of the innovation diffusion process in which social influences have a significant effect on intention. According to innovation diffusion theory, an IT adoption creates uncertainty about its expected consequen-

ces for the potential adopters. Since the level of uncertainty declines as individuals move through the stages of the adoption process, the impact of interpersonal and social norms will therefore decline and diminish to nonsignificance over time. However, interpersonal and social norms had significant indirect effects on behavioral intention through attitude toward the e-service usage. It implies that attitudes are developed in social networks and are affected by social influences and consumers with more favorable attitude toward the e-service use are more likely to accept and use it.

The present study confirmed that perceived usefulness and perceived playfulness contributed to the shape of an individual's positive attitude, whereas perceived risk had a negative effect on attitude. Perceived usefulness appeared to be a stronger predictor of attitude than perceived playfulness. In other words, the positive extrinsic (economic) motivation factor (e.g., usefulness) has more powerful effect than the positive intrinsic factor (e.g., playfulness) to build positive attitude.

The findings of the present study have various implications for research as well as practice. First, this study provides an initial step toward the application of Internet self-efficacy (ISE) to the study of consumers' decisions in the e-service use. Our research confirms that Internet self-efficacy is a meaningful construct within the context of e-services on the Web. The results indicate that consumers with higher Internet self-efficacy are more likely to use e-services. It implies that increasing consumers' Internet self-efficacy is critical to the success of an e-service. Second, two types of ISE beliefs (general vs. specific) were simultaneously explored in a single context of e-service usage. In this study, both measures of ISE performed well within the model and had differential levels of effectiveness. This will further the development of a multi-level theory of efficacy and Internet/WWW usage. Third, this study implies that usefulness, playfulness, and risk beliefs will play important roles in affecting users' decision processes of e-services adoption. Many designers believe that key barrier to user acceptance is the lack of performance improvement and playfulness of current e-services. Yet our data indicates that although usefulness and playfulness of the e-service is clearly important, the risk of using the service is also important and should not be overlooked. Therefore, IS practitioners must reflect extrinsic (economic) motivation as well as intrinsic motivation issues in user interface and functionality design of e-services and try to improve consumer's subjective assessment of uncertainty and adverse consequences of transacting and using services on the Internet.

Although the findings are encouraging and useful, the present study has certain limitations and needs further researches. First, the model explained 30% of the variance in e-service usage. The relatively low figure of the present study may partly be explained by its focus on Internet self-efficacy. This figure implies that our model might have missed some important factors that have direct or indirect effects on consumers' decisions in e-service usage. Therefore, there is a need for further investigation on other factors, such as trust, perceived compatibility, prior experience, system quality, information quality, service quality, etc. Second, whether our findings could be generalized to all e-services is unclear. Further research is necessary to verify the generalizability of our findings. Third, the data presented is cross-sectional, longitudinal data will be needed in the future to assess what factors will influence consumers' decisions in continuing to use the e-service and shifting to e-service instead of remaining to use the brick-and-mortar service. Fourth, SCT [9] explains human behavior in terms of triadic and reciprocal causation among behavioral, personal, and environmental factors. Individuals with beliefs in their efficacy set more positive outcome expectations for themselves and thus mount the level of motivation needed to reach higher levels of performance. This successful performance experience then enhances subsequent judgments of efficacy and increase outcome expectations. Future research should collect longitudinal data to test predictive validity and reciprocal causality that should exist between Internet self-efficacy and e-service usage. Finally, the usage of the e-file service is currently voluntary (under tax payers' full volitional control). The findings may not be generalized to the mandatory setting. Hartwick and Barki [26] theorized and found support to the notion that voluntary use of IT is under an individual's control and likely to be based on attitudinal considerations, whereas mandatory use is also under an individual's control but is likely to based on normative considerations. Thus, further research is necessary to verify the differences between the voluntary and mandatory settings.

References

[1] I. Ajzen, Attitudes, Personality, and Behavior, Dorsey Press, Chicago, IL, 1988.

[2] I. Ajzen, The theory of planned behavior, Organizational Behavior and Human Decision Processes 50 (1991) 179–211.

[3] I. Ajzen, Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior, Journal of Applied Social Psychology 32 (2002) 665–683.

[4] I. Ajzen, B.L. Driver, Application of the Theory of Planned Behavior to leisure choice, Journal of Leisure Research 24 (3) (1992) 207–224.

[5] R. Agarwal, J. Prasad, Are individual differences germane to the acceptance of new information technologies, Decision Sciences 30 (2) (1999) 361–391.

[6] R. Agarwal, V. Sambamurthy, R. Stair, The evolving relationship between general and specific computer self-efficacy: an empirical investigation, Information Systems Research 11 (4) (2000) 418–430.

[7] C.J. Armitage, M. Conner, J. Loach, D. Willetts, Different perceptions of control: applying an extended theory of planned behavior to legal and illegal drug, Basic and Applied Social Psychology 21 (1999) 301–316.

[8] A. Bandura, Self-efficacy mechanism in human agency, American Psychologist 37 (2) (1982) 122–147.

[9] A. Bandura, Social Foundations of Thought and Action: A Social Cognitive Theory, Prentice-Hall, Englewood Cliffs, NJ, 1986.

[10] A. Bandura, Self-Efficacy: The Exercise of Control, Freeman, New York, NY, 1997.

[11] I. Berger, The relationship between environmental attitudes and behaviour, Canadian Journal of Marketing Research 12 (1993) 36–43.

[12] A. Bhattacherjee, Acceptance of e-commerce services: the case of electronic Brokerages, IEEE Transactions on Systems, Man and Cybernetics, Part A, Systems and Humans 30 (4) (2000) 411–420.

[13] M.K. Chang, Predicting unethical behavior: a comparison of the Theory of Reasoned Action on the Theory of Planned Behavior, Journal of Business Ethics 17 (16) (1998) 1828–1834.

[14] P.Y.K. Chau, P.J.H. Hu, Information technology acceptance by professionals: a model comparison approach, Decision Sciences 32 (4) (2001) 699–719.

[15] L.D. Chen, M.L. Gillenson, D.L. Sherrel, Enticing online consumers: an extended technology acceptance perspective, Information and Management 39 (8) (2002) 705–719.

[16] W.W. Chin, Issues and opinion on structural equation modeling, MIS Quarterly 22 (1) (1998) vii–xvi.

[17] D.R. Compeau, C.A. Higgins, Computer self-efficacy: development of a measure and initial test, MIS Quarterly 19 (2) (1995) 189–211.

[18] D.R. Compeau, C.A. Higgins, Social cognitive theory and individual reactions to computing technology: a longitudinal study, MIS Quarterly 23 (2) (1999) 145–158.

[19] F. Davis, Perceived usefulness, perceived ease of use, and user acceptance of information technology, MIS Quarterly 13 (3) (1989) 319–340.

[20] F. Davis, R.P. Bagozzi, P.R. Warshaw, User Acceptance of computer technology. A comparison of two theoretical models, Management Science 35 (8) (1989) 982–1003.

[21] E.L. Deci, Intrinsic Motivation, Plenum, New York, 1975.

[22] M.A. Eastin, Diffusion of e-commerce: an analysis of the adoption of four e-commerce activities, Telematics and Informatics 19 (3) (2002) 251–267.

[23] M.A. Eastin, R.L. LaRose, Internet self-efficacy and the psychology of the digital divide, Journal of Computer Mediated Communication 6 (1) (2000), Available at: http://www.ascusc.org/jcmc/vol6/issue1/eastin.html.

[24] M.S. Featherman, P.A. Pavlou, Predicting e-service adoption: a perceived risk facets perspective, Proceedings of the Eighth Americas Conference on Information Systems, 2002, pp. 1034–1046.

[25] C. Fornell, D.F. Larcker, Evaluating structural equation models with unobservable and measurement error, Journal of Marketing Research 18 (1981) 39–50.

[26] J. Hartwick, H. Barki, Explaining the role of user participation in information system use, Management Science 40 (4) (1994) 440–465.

[27] T. Hill, N.D. Smith, M.F. Mann, Role of efficacy expectations in predicting the decision to use advanced technologies: the case of computers, Journal of Applied Psychology 72 (2) (1987) 307–313.

[28] M. Igbaria, J. Iivari, The effects of self-efficacy on computer usage, Omega 23 (6) (1995) 587–605.

[29] S.L. Jarvenpaa, N. Tractinsky, M. Vitale, Consumer trust in an Internet store, Information Technology Management 1 (1999) 45–71.

[30] Y.J. Joo, M. Bong, H.J. Choi, Self-efficacy for self-regulated learning, academic self-efficacy, and Internet self-efficacy in Web-based instruction, Educational Technology Research and Development 48 (2) (2000) 5–17.

[31] E. Karahanna, D.W. Straub, N.L. Chervany, Information technology adoption across time: a cross-sectional comparison of pre-adoption and post-adoption beliefs, MIS Quarterly 23 (1999) 183–213.

[32] R. LaRose, D.A. Mastro, M.A. Eastin, Understanding Internet usage: a social cognitive approach to uses and gratifications, Social Science Computer Review 19 (2001) 395–413.

[33] G.M. Marakas, M.Y. Yi, R.D. Johnson, The multilevel and multifaceted character of computer self-efficacy: toward clarification of the construct and an integrative framework for research, Information Systems Research 9 (2) (1998) 126–163.

[34] A.S.R. Manstead, S.A.M. van Eekelen, Distinguishing between perceived behavioral control and self-efficacy in the domain of academic achievement intentions and behaviors, Journal of Applied Social Psychology 28 (1998) 1375–1392.

[35] K. Mathieson, Predicting user intentions: comparing the technology acceptance model with the theory of planned behavior, Information Systems Research 2 (3) (1991) 173–191.

[36] J.W. Moon, Y.G. Kim, Extending the TAM for a World Wide Web context, Information and Management 38 (4) (2001) 217–230.

[37] J.C. Nunnally, Psychometric Theory, McGraw-Hill, New York, 1978.

[38] T.A. Oliver, F. Shapiro, Self-efficacy and computers, Journal of Computer-Based Instruction 20 (1993) 81–85.
[39] P.A. Pavlou, Integrating the technology acceptance model with trust in electronic commerce-model development and validation, Proceedings of the 2001 Americas Conference in Information Systems, Boston, MA, 2001, pp. 816–822.
[40] P.E. Pedersen, Adoption of mobile Internet services: an exploratory study of mobile commerce early adopters, Journal of Organizational Computing and Electronic Commerce (in press).
[41] E.M. Rogers, Diffusion of Innovations, The Free Press, New York, 1983.
[42] E.M. Rogers, Diffusion of Innovations, The Free Press, New York, 1995.
[43] C. Steinfield, P. Whitten, Community level socio-economic impacts of electronic commerce, Journal of Computer Mediated Communication 5 (2) (2000), Available at: http://www.ascusc.org/jcmc/vol5/issue2/steinfield.html.
[44] S. Taylor, P.A. Todd, Understanding information technology usage: a test of competing models, Information Systems Research 6 (2) (1995) 144–176.
[45] T.S.H. Teo, V.G.K. Lim, R.Y.C. Lai, Intrinsic and extrinsic motivation in Internet usage, Omega: The International Journal of Management Science 27 (1999) 25–37.
[46] L.F. Thompson, J.P. Meriac, J.G. Cope, Motivating online performance: the influences of goal setting and Internet self-efficacy, Social Science Computer Review 20 (2) (2002) 149–160.
[47] G. Torkzadeh, T.P. Van Dyke, Development and validation of an Internet self-efficacy scale, Behaviour and Information Technology 20 (4) (2001) 275–280.
[48] V. Venkatesh, G.M. Morris, L.A. Phillip, A longitudinal field investigation of gender difference in individual technology adoption decision-making processes, Organizational Behavior and Human Decision Processes 83 (1) 2000, pp. 33–60.

Professor **Meng-Hsiang Hsu** holds a PhD degree from National Sun-Yat-Sen University, Taiwan. He is currently a faculty at the Department of Information Management, National Kaohsiung First University of Science and Technology. Professor Hsu's research interests include information ethics and electronic commerce. He has published articles in *Journal of Business Ethics*, *Behavior and Information Technology*, and *Decision Support Systems*.

Chao-Min Chiu is an Associate Professor in the Department of Information Management at the National Kaohsiung First University of Science and Technology, Taiwan, Republic of China. He holds a PhD in Management from the Rutgers University. His current research interests include hypermedia support for decision-making, electronic commerce, and knowledge management. His researches have been published in the *Computer Networks and ISDN Systems*, *Information and Management*, *Information and Software Technology*, *Information Systems Management, Information Technology and Management*, *Journal of Information Science*, etc.