E-government web site enhancement opportunities: a learning perspective

Jen-Hung Huang

Department of Management Science, National Chiao Tung University, Hsinchu, Taiwan, and

Stacy Huey-Pyng Shyu

International College, Ming Chuan University, Taoyuan, Taiwan

Abstract

Purpose – This study seeks to develop a framework of analysis that categorizes features of e-government web site design in a matrix of knowledge-acquiring process versus learners' values. The proposed framework supports a development plan for a cyber governmental web site that may involve all aspects of a learning process.

Design/methodology/approach – A framework for analysis is first proposed. Data were obtained from 137 part-time students during a class. Participants were requested to enter the Bureau of Foreign Trade (BOFT) web site to learn a subject of their choice in a computer lab. The instruments used for obtaining their opinions were open-ended questionnaires. Two focus group interviews were also conducted. An iterative analyzing strategy based on grounded theory was employed to obtain the results.

Findings – Analytical results of the data based on the framework reveals many insights. Participants indicated that navigational aids, knowledge contents and other designs related to interactive knowledge sharing are important. Nevertheless, e-government webmasters often ignore these important features. The proposed framework is a valuable tool for web site development and maintenance.

Originality/value – Although many theories about the usability of e-government web sites have been proposed, the needs of individual learners have seldom been addressed. Since learning is critical to economic prosperity and social cohesion, the factors that make an e-government web site supportive for learners should be explored. This study is, to our knowledge, the first to examine an e-government web site from a learner perspective. Furthermore, this investigation presents a framework that facilitates analyzing and improving e-government web sites.

Keywords Learning, Worldwide web, Government

Paper type Research paper

Introduction

According to the annual Global e-Government Study by Brown University in the USA, which evaluated e-government based on information availability, service delivery, and public access, Taiwan ranked the world's number one in 2003 and 2004, among the 198 countries surveyed (West, 2006). The e-government infrastructure in Taiwan provides its citizens and organizations with convenient access to government information and services. To accelerate the development of e-government and reshape the paradigm of knowledge-based services, the Taiwanese government has established a variety of web-based learning portals to improve effectiveness in knowledge sharing and

citizens' lifelong learning. For instance, the Lifelong Learning Portal, as established by the Central Personnel Administration, targets civil servants to improve their job-related skills. Another government web-learning medium is the Bureau of Foreign Trade (BOFT), which aims to provide learners with knowledge about international business regulations, overseas governmental policy, international business analysis and trade opportunities.

Due to the continually increasing levels of government information and services moving online, and the many government agencies having the ultimate goal of developing a global knowledge-sharing platform, research about e-government needs to address the volume of information and services available on e-government sites, as well as the manner in which the sites deliver those information resources and services according to their target users and how the sites serve the requirements of prospective users. That is, although e-government web sites are often regarded as an important source of reliable information and "objective authoritative sources" (Jaeger and Thompson, 2004), their knowledge value will be more fully realized if learners' perceptions of web sites are explored and considered in their design.

Researchers have recently developed various web-usability indicators to measure citizens' adoption of e-government. For example, Huang and Chao (2001) analyzed 33 web sites of Taiwan's central governmental agencies based on 18 selected web-usability indicators. Fu *et al.* (2006) used the theory of planned behavior to examine the willingness of different groups of taxpayers to adopt eTax. King's (2007) customer relationship management (CRM) progressive strategic framework showed that e-government CRM projects should be adapted to three major goals:

(1) improving accessibility;

(2) organizational transformation; and

(3) service delivery innovation.

Although many theories about usability of e-government web sites have been proposed, few have addressed the needs of individual learners. Web sites are intended to facilitate knowledge acquisition (Fang and Holsapple, 2003), and are often "Treasure Islands" of educational resources for citizens (Okamoto, 2005). Furthermore, information can be shared, rebuilt, accumulated and reused via the e-government web site interface. Because learning is critical to economic prosperity and social cohesion, the factors that make an e-government web site supportive for learners deserve to be explored.

Although e-government plays a significant role in learning, few investigations have considered whether the presentation of information is supportive or inspiring for learners. To address this issue, this work introduces a framework that facilitates analyzing and improving e-government web sites from a learner perspective. New insights can usually be obtained when a user-oriented classification scheme is added (Pu and Yang, 2003; Yang *et al.*, 2006).

Learners as customers

Rosenberg (2001) defined learning as the way that "people acquire new skills or knowledge for the purpose of improving their performance". Potential knowledge, which may become orphaned in the higher education curricula development, includes practical knowledge of customers, competitors, suppliers and government, and any

other source incurred by the external environment. The provision of learning activities via a web-based medium is distributed among social educational environments, including extracurricular groups, and can directly enhance a learner's experience (Deek and Espinosa, 2005). Distributed learning, which evolved from the concept of distributed resources, can be utilized to support conventional classroom-based courses or distance learning courses that enable instructors, students and content to be located in different, non-centralized locations (Saltzberg and Polyson, 1995). Distributed learning is an instructional paradigm based on the needs of learners and the application of electronic tools to facilitate learning. Hence, a curriculum-related learning from e-government web sites can be viewed as a distributed learning experience.

For a governmental organization that provides information and training, the customer is the learner. Learners may compare their past experience of using other commercial web sites with that of utilizing governmental web sites. Hence, web features and customer values experienced on business web sites are important factors that would affect learners' evaluations of their experiences with governmental web sites.

Customer values

Wan (2000) presented that values important to online bookstore shoppers include information, friendliness, responsiveness and reliability. E-service processes – comprising promotion, pricing, transaction, and service – are evaluated in terms of customers' values, resulting in a matrix that is valuable for discovering the web's strength and weakness for a webmaster. Chiu *et al.* (2005) categorized the concerns of customers when searching for product information into five factors:

(1) connectivity;

(2) information quality;

(3) interactivity;

(4) playfulness; and

(5) learning.

Some e-governmental agencies provide online information that is valuable for learners to acquire for their jobs or course requirements. Since visitors may compare the characteristics of the normative commercial web site with those of e-government web sites, the features and values found in previous business web sites are important. This work modifies the values proposed by Wan (2000) and Chiu *et al.* (2005). The new criteria are defined as follows:

- *Informativeness*. Researchers contend that a primary goal of an organization's web site is to provide information available to prospects, customers, and other stakeholders (Chen and Wells, 1999). Many organizations regard their web sites as billboards. Angehrn (1997) referred to a web site as a "virtual information space". Visitors need to find the information useful. Ducoffe (1996) considered "informativeness" as the most significant issue. An e-government web site is an interface between citizens and the government. Users come to the e-government web site with a variety of information needs. In particular, educators need relevant and stimulating materials in order to teach their students and support research (Sepic and Kase, 2002).

- *Connectivity*. Connectivity refers to the ability of customers to assess relevant web sites (Chiu *et al.*, 2005; Huizingh, 2000). Connectivity originates from the open and global nature of the internet. Connectivity allows organizations to provide information to a very large audience. Moreover, web sites can be linked to each other through hypertext links. For citizens searching for related public policies across governmental interagencies, connectivity facilitates the intelligible search of subject areas via well-designed hypertext links (Chiu *et al.*, 2005; Jaeger and Thompson, 2004).

- *Playfulness*. Prior investigations have addressed playfulness as one of the intrinsic motivators for learners to engage in web-based learning (Lee *et al.*, 2005). The decision to acquire knowledge through virtual learning environments is determined partly on a rational calculation of the benefits. However, visitors also need a virtual learning environment that engages their attention by being fun, enjoyable and pleasurable. Users are mostly likely to visit a web site repeatedly if they find their visits enjoyable (Rice, 1997). Huizingh (2000) and Chiu *et al.* (2005) similarly found that customers attribute entertainment to their involvement with web sites.

- *Friendliness*. If an e-government web site is a simulation of a service encounter in the physical world, then friendliness is a measure of the citizen's visiting experience. The content and accessibility of the web site can be assessed in terms of "irritation" versus "entertainment" (Wan, 2000). Knowledge-based e-governmental sectors in general include not only visiting and browsing, but also querying and presentation of search results, and clear and easy-to-follow instructions for e-services.

- *Responsiveness*. This term is defined as willingness to assist customers (Wan, 2000; Watson *et al.*, 1998); it can be measured by the duration of time before replying to a customer's inquiries. However, responsiveness in the context of an e-government web site can also be measured according to the public sector's reaction to the latest practical knowledge or information changes in the macro environments, such as regulations, policies and business/training opportunities. The advent of the internet and computer-mediated technology means that any delay in responding irritates users and has little excuse. Furthermore, responsiveness includes the delivery of reliable public services in real time.

Learning dimensions

The goal of education is to develop mature thinkers who can acquire and utilize knowledge (Marzano *et al.*, 1988). For instance, Anderson (1977) and Rumelhart (1980) stressed the essential role of "searching for meaning" in cognition. Towards this end, model learners actively work to combine new information with what they already know, select the important facts, make inferences beyond the information given, and think strategically about their own learning (Marzano *et al.*, 1988).

Among the 21 thinking processes derived by Marzano *et al.* (1988), two are concerned with focusing, two with information collection, two with remembering, four with organizing, four with analyzing, three with generating, two with integrating, and two with measuring. This study develops three major learning dimensions based on the 21 processes. The three dimensions are elucidated below.

Knowledge acquisition and integration
Knowledge acquisition is defined as the process of accumulating and identifying useful information (Nonaka and Takeuchi, 1995). Knowledge can be obtained through the internet, social activities, training sessions and consultations. Social activities include chatting with friends, and interactions with people working in the same field. Integrating new knowledge is the process of organizing and relating the new information to make it part of long-term memory.

Students acquiring new skills need to learn a model or a set of steps, shape the skill to make it efficient and effective for them, and finally internalize or practise the skill so they can perform it easily.

Knowledge extension and refinement
Learning does not end with acquiring and integrating knowledge. Learners develop in-depth understanding by extending and refining their knowledge, for example by making new distinctions, clearing up misconceptions and drawing conclusions. In this phase, they analyze what they have learned by applying reasoning processes that help them extend and refine the information.

Meaningful application of knowledge
The most effective learning occurs when knowledge can be applied to perform meaningful tasks. The processes of exploiting and applying knowledge are termed "knowledge leverage" (Nonaka and Takeuchi, 1995). For instance, a person might initially learn about foreign trade opportunities with European markets by reading a magazine article about them, or by chatting with a friend. However, the person learns more about it when trying to determine what products to export or import. By asking administrative e-government agencies (e.g. The Bureau of Foreign Trade) for problem solving, customers gain assistance concerning the latest and most reliable information through one-to-one interactive email services and through e-newsletters.

The framework: learning-value matrix of web attributes
As demonstrated by the above discussion, an e-government web site can be viewed as an interface between government and its customers as learners. A matrix framework of web attributes can be built (Table I) by evaluating the three learning dimensions in terms of the five categories of customer values. The 3×5 matrix is thus constructed as a general framework for most e-government sectors. This framework provides opportunities to e-government for facilitating knowledge acquisition and integration, knowledge extension and refinement, and knowledge leverage of its e-citizens. Table I presents the analysis of web sites based on the matrix.

Study methodology
The web site for this study
The analysis in this study was based on the BOFT web site in Taiwan (http://cweb. trade.gov.tw), the contents of which were accessed on 13 November 2006. The official BOFT web site was selected rather than local or central government web sites for two reasons. First, general government web sites cover a wide range of activities, and therefore may not generate sufficiently specific results for detailed exploration. A specific site is the most appropriate unit of analysis for a case study (Yin, 2002).

Learning dimensions	Informativeness	Connectivity	Customer values Playfulness	Friendliness	Responsiveness
Knowledge acquisition and integration	1. Provide rich information 2. Information cataloging	1. Linking to relevant web sites	1. Playful web site atmosphere	1. Simple navigational scheme 2. Customer support	1. Presenting timely information 2. Quick response to customer query
Knowledge extension and refinement	1. Organizing important information from resourceful Q&A (question and answer) with professional opinions	1. Offering search tips to extend further connections 2. Providing a multiple search interface	1. Creating e-social strategies to extend knowledge among learners 2. Connecting to the larger community of skilled learners	1. User-friendly facilities to help users locate the past and latest information to facilitate knowledge comparisons and refinement	1. Accurate and consistent services to help users to locate the previous and latest information in order to facilitate knowledge comparisons and refinement
Meaningful application of knowledge	1. Information applied in global business opportunities and investments	1. Opportunity/ability to access other relevant intra/international e-government agencies and exploit business opportunities	1. Hosting e-expert activities or holding e-socialized expert knowledge application activities	1. Friendly personalized service for problem solving when users need to apply the knowledge	1. Timely personalized service for problem solving when users need to apply the knowledge

Table I.
Learning dimensions-customer values matrix of web attributes

Second, Taiwanese citizens can acquire knowledge related to the international economy, international business opportunities and trade policies of various countries from the BOFT web site. Taiwan's foreign trade dependence, i.e. the ratio between foreign trade and GDP was greater than 50 percent in 2004 and 2005 according to the BOFT web site (BOFT, 2007). These figures indicate that the Taiwanese economy depends heavily on foreign trade. Therefore, the BOFT web site plays a significant role in Taiwan's daily economic activities, and provides an opportunity for its customers to fulfill learners' needs.

Before choosing the BOFT web site, the advantages and limitations of the BOFT web site were also compared with those of other government agency web sites. Some e-government web sites are intended for e-learning. For instance, the Lifelong Learning Portal targets civil servants to improve their job-related skills. However, these sites are not a general e-government web sites, and therefore are not suitable for this study. Some web sites created by government agencies, such as those of the Tourism Bureau and the Government Information Office, are similar to the BOFT web site. The Tourism Bureau web site, which promotes tourism in Taiwan, is visited mainly for tourist information, rather than for knowledge to help learners do their jobs. The Government Information Office web site provides a variety of information, including news from the executive branch of the government. However, its coverage is too broad to examine in detail. Conversely, the BOFT web site provides focused, rich information, both global and local, for various stakeholders, including citizens as learners, citizens as businessmen and foreigners with business interests in Taiwan. Additionally, the results from studying the BOFT web site may be easier to generalize to other countries than the results from studying other e-government web sites, because it is less localized. Therefore, the BOFT web site was selected as the site for this study.

Sample and data collection procedure

The convenience sampling method was adopted to select 137 part-time students enrolled in the Department of International Business in Northern Taiwan in 2006. The part-time students had more similar socioeconomic characteristics than the full-time students to citizens in general. The respondents were taking Foreign Trade and Practices courses at undergraduate level. All of them had taken a one-year course on international business fundamentals. Some of the respondents had jobs related to international business. Since they were enrolled in the Department of International Business Administration, and many of them were working or would be working in related fields, they were motivated to learn from the BOFT web site. To encourage the participants to examine the web site carefully, the answers to the questionnaire accounted for 10 per cent of their grades for the course. The sampling strategy was considered appropriate since this study was exploratory in nature, and the students had the motivation to learn from the BOFT web site.

The data collection procedure consisted of two stages. In the first stage, the participants browsed the BOFT web sites during a class to learn a subject of their choice in a computer lab. The participants received a four-part questionnaire. Part 1 of the questionnaire explained the objective of the distributed-learning program from the BOFT web site. Additionally, this section elucidated the importance of e-government knowledge acquisition, integration, extension and refinement, and the applicability of

e-government web sites as lifelong learning resources. Part 2 required the respondents to answer essay questions on the following topics:

- the title of the subject of interest;
- navigation path for finding the subject;
- reasons for selecting the subject and a brief summary of the subject content; and
- comments about the subject (what they learned from the web site, knowledge areas to improve their skills or academic performance, and the intention to establish a continuous learning relationship with the web site).

Part 3 required respondents to provide opinions on how to improve the web site according to their learning experience. The participants were asked to answer the following open-ended questions:

- What characteristics or designs of the web site did you like and not like?
- What obstacles/problems did you encounter in this distributed learning experience?
- Do you have any other positive suggestions for resolving the problems?

Part 3 included the learning dimensions-customers values matrix of web attributes as shown in Table I as cues for students to provide opinions for in-depth investigation. Part 4 requested the demographic information of the respondents.

The purpose of the second stage was to clarify issues raised by participants in the first stage, and to explore their opinions further. Two focus group sessions were performed after the classes. Ten students participated in each session, and were awarded extra credits.

Table II shows the characteristics of the 137 participants. The subjects of interest chosen by participants were international trade and practices course related (35 percent), international trade business job-related policy (33 percent), foreign investment-related analysis (16 percent), international e-commerce business policy (6 percent), part-time overseas employment opportunities (5 percent) and others (5 percent).

Participants' opinions of the web site were analyzed. All questionnaires were analyzed by two researchers. Participants' answers to questions in the questionnaire were first categorized according to the learning process, namely knowledge acquisition and integration, knowledge extension and refinement, and meaningful application of knowledge. Participants' answers in each learning process category were then further classified in terms of customer values, namely informativeness, connectivity, playfulness, friendliness, and responsiveness. The questionnaires were analyzed in two stages, involving an iterative analyzing strategy based on the general procedures of grounded theory (Strauss and Corbin, 1990). The first stage of coding involved categorizing the data by looking for differences and similarities within and across respondents. This initial process of coding, termed "open coding", was performed to identify concepts. Data were first broken down into discrete parts. Parts that appeared to pertain to similar contents or features were then grouped into a category. The second stage of coding was selective coding, in which the core category of study was discovered and related to the other categories. The aim of this stage of coding was to integrate and refine categories. Throughout the coding process, the researchers

	Number of participants (n = 137)	Percentage
Gender		
Male	47	34.3
Female	90	65.7
Age		
20-25	89	65.0
26-30	34	24.8
31-35	11	8.0
36-40	3	2.2
Occupation		
Sales representative	38	27.7
Secretary/office clerk/assistant	53	38.7
Sales manager	9	6.6
Couriers and messengers	6	4.4
Self-employed	6	4.4
Personal financial advisor/manager	6	4.4
Production supervisor	4	2.9
Purchasing manager	3	2.2
Others	12	8.8
Years of work experience		
≤ 1	31	22.6
≥ 2 and < 4	93	67.9
≥ 4 and ≤ 5	8	5.8
> 5	5	3.7

Table II.
Characteristics of participants

identified quotes and ideas that did not fit into the emerging framework, in order to ensure that the data were not being forced into this framework.

Results

Web site characteristics that emerged from this rigid coding procedure were classified according to the matrix, and are summarized in Table III.

Knowledge acquisition and integration

The ideal web site leads its visitors to the information that they are seeking in a straightforward and efficient manner (Robins and Kelsey, 2002). The main page of the BOFT web site displays a web site map, topic menu, coverage overview and graphics that enhance the clarity of presentation. A learner can thus easily use the web site to acquire needed information.

A user can easily find information about a specific topic and hot news in the most conspicuous corner of the homepage without clicking on any link. To facilitate the integration knowledge with additional job-related experience and capability, participants recommended that the web site present hot issues such as trade business events, seminars and information of trade-related certificates. Users thus want a service similar to online one-stop government (Glassey, 2004; Dias and Rafael,

Learning dimensions	Informativeness	Connectivity	Customers' values		
			Playfulness	Friendliness	Responsiveness
Knowledge acquisition and integration	Main homepage categorizes the organization of the information into special topics, hot news, *events, seminars, and license examination information* (response rate: 38/137 = 28 percent)	Web site map, topic structure menu, *advanced webpage searched by date, subject, country and system* (response rate: 29/137 = 21 percent)	Graphics, *animated pictorial illustration,* color cohesion (response rate: 28/137 = 20 percent)	*Supportive document icon bars such as* "E-help desk" and "Mail to" (response rate: 17/137 = 12 percent)	Load time, *showing subtopics, and update information* (response rate: 51/137 = 37 percent)
Knowledge extension and refinement	*Case study of best practice, experience sharing and cross-country comparisons* (response rate: 68/137 = 14 percent)	*Search tips* and selection of search coverage (response rate: 33/137 = 24 percent)	*Real-time news, discussion room, and virtual community* (response rate: 14/137 = 10 percent)	WTO dictionary and online dictionary for terminology checking (response rate: 20/137 = 15 percent)	Accuracy and speed of updating information (response rate: 49/137 = 36 percent)
Meaningful application of knowledge	*Knowledge content in several language (Chinese, English, and Japanese) and trade-related financial market information* (response rate: 24/137 = 18 percent)	Recommending reference linkage affiliated with official/global e-government web site (response rate: 31/137 = 23 percent)	Knowledge-based blogging (response rate: 18/137 = 13 percent)	Customized e-newsletter (response rate: 69/137 = 50 percent)	Acknowledgement of e-service registration (response rate: 44/137 = 32 percent)

Notes: Italics represent the improvements recommended by some of the 137 participants

Table III.
Web characteristics classified according to the matrix

2007). The BOFT web site has links to other e-government agency sites. Each link displays the logo of the appropriate agency along with the title of a specific hot topic. To improve connectivity, participants recommended adding an advanced webpage search function, enabling a user to search information by date, subject and country, rather than only by a few criteria specified by the system designer. To enhance the learning motivation, participants recommended making the web site more active and lively. Namely, the web site needed to ensure a comfortable and enjoyable e-reading environment. This is consistent with Richard's (2005) conclusion that entertainment influences site involvement and attitude toward the site. The color cohesion of the web pages was considered as pleasing. The friendliness of the webpage is indicated by how easily a visitor can find information. Participants wished for tools to improve web site navigation. Ghaoui (2000) suggested that document icons help navigation. Participants also recommended adding "e-help desk" and "mail to" icon bars at the bottom of the homepage to respond to any requests for feedback concerning the document they needed.

Three aspects of responsiveness were addressed:

(1) *Loading time*. Graphics and frames may take a long time to download in some connections. A "text only" option on the homepage would be helpful for those users (Apte *et al.*, 2003).

(2) *Showing subtopics*. Learners do not see any subtopics when they point at a topic on the main menu. They have to click on the topic, and wait for the entire page to download in order to know the subtopics. Participants recommended that subtopics should appear when the mouse is pointed at the topic without clicking.

(3) *Update information*. Participants reading a page did not know whether the information on the page was current. They recommended that web pages should show update messages, including next and previous update times, so that learners could schedule their revisit times to access the latest information.

Knowledge extension and refinement

Many participants indicated that the e-government web site was an excellent and reliable learning resource that assisted them in writing business reports and undertaking research. From this perspective, participants wished to see real case studies of best practice, experience sharing and cross-country comparisons on the web site. For connectivity, they suggested that the web site provide search tools offering search tips and search coverage categorized as "within this site", "within related government site" and "others: Google or Yahoo! search engine" to help a learner to clarify an issue.

To ensure playfulness, participants requested real-time news, discussion rooms and virtual communities, which can reduce boredom and enhance their interest in learning. Song *et al.* (2004) found that a lack of community generates barriers in online learning environments. The friendliness issue focused on the existing design of the World Trade Organization (WTO) dictionary for learners. Participants also recommended an online electronic dictionary for checking the meaning of specialized terminology as an explicit design preference. In this phase, the responsiveness issue again emphasized

improving the accuracy and speed of updating information in order to extend knowledge.

Meaningful application of knowledge

Participants indicated that English is an important tool for their daily jobs, and that they can improve their job performance by cultivating bilingual language expertise. Hence, they hoped to find asynchronous translation of a webpage in an English version that conformed to the version in their native language, so that they could easily apply what they had learned from the web pages. This requirement poses a serious challenge to web designers, since text translation involves many concerns, including disagreement regarding the meaning of words and terminology, phrases and meanings that cannot be translated, the direction the text and formats of dates, times and names (Hillier, 2003). Other popular languages, such as Japanese, are also recommended as language options.

Participants also recommended that the web site should include knowledge that is helpful for a manager's real-life decision making, by including features such as real-time key currency exchange rates, major international stock market indexes and international commodity pricing. Participants also attempted to compare the official e-government web site with similar web sites of other countries. Therefore, they recommended a searching function that includes affiliated official global web sites. To improve playfulness, younger learners proposed adding a knowledge-based blog to involve them in online knowledgeable interactivity. While blogs, wikis and discussion forums can all be applied to share knowledge, the community types best supported by each technology deserve further research (Wagner and Bolloju, 2005).

For the friendliness issue, participants recommended adding a customized e-newsletter service categorized by subject and country to assist them in lifelong learning. Over half of the participants expressed a wish to subscribe to the e-newsletter. Unfortunately, participants could not successfully register for the e-newsletter service on the web site. Participants stated that acknowledgement of completed registration of the e-service is very important.

Discussion and implications

No previous studies have examined government web sites from the learner's perspective. This study develops a framework for analyzing e-government web site designs, placing features in a matrix of learning dimensions versus learner values. The framework can help webmasters develop better e-government web sites by presenting features of interest to learners. The findings of this study have several implications for e-government web site design and for future studies.

Implications for e-government web site design

Previous studies have shown that customers value informativeness, connectivity, playfulness, friendliness and responsiveness when visiting a web site (Chiu *et al.*, 2005; Wan, 2000). The proposed matrix illustrates the meaning of these values, and what customers want from the learner's perspective. The analytical results provide many insights. For example, learner-specific interactive dialogue mechanisms such as discussion rooms, virtual reading communities, wikis and knowledge-based blogging features are desirable. "Case study" and "best practice" are valuable learning features

for participants. Informative features should include announcement of special hot topics, events and seminars. A multilingual web site can be valuable for learners to improve their global viewpoints and their careers. Most notably, more than half of the participants attempted to register for the e-newsletter service. They trusted government web site not to disclose personal information for commercial purposes, and to provide reliable information. By subscribing to the e-newsletter service, they expected to obtain the latest news, and to share information with friends or coworkers. Designers should address these factors by providing two-way interaction with the e-government site in order to improve its effectiveness.

Analytical results indicate that a customer-focused approach can reveal significant insights for web design (Chalmeta, 2006). Designers should regularly consult their customers, using methods such as focus group interviews and surveys, to discover what customers want from their web sites. A web site can attract many loyal customers, and remain competitive by offering what customers want.

Implications for future studies
This study develops a valuable framework for analyzing a web site, to enable it to fulfil the needs of its users. This investigation discovers many desirable web site design features. Some of these design features deserve careful study. First, similar to the concept of one-stop e-government (Glassey, 2004; Dias and Rafael, 2007), one-stop trade-related web sites around the world pose a serious challenge for both scholars and web designers. Second, the responses of the participants and previous research (Richard, 2005) indicate that generating a comfortable and enjoyable e-reading environment is desirable. Future research should compare the effectiveness of different ways of making web sites entertaining. Third, providing an English translation of a webpage that conforms to the version in the user's native language is an interesting subject. Hillier (2003) examined the role of cultural context in the usability of multilingual web sites and suggested further research. Fourth, the most effective interactive feature for e-government web site learning, from among discussion forums, virtual reading communities, wikis and knowledge-based blogging, is worth further study. Wagner and Bolloju (2005) concluded that different community types are best supported by different technologies. Empirical studies may be needed in this case to determine what design features work best for e-government web sites.

Finally, this study has limitations, which also point to areas for future study. This study examined only the BOFT web site. Future studies should explore various e-government web sites. Furthermore, the subjects of this study investigation were part-time students with the motivation to learn for their courses and for their jobs. Future studies should include the general public. Attracting the general public to e-government web sites for life-long learning presents a major challenge. The proposed framework can be refined and generalized by extending both the number of web sites and the scope of subjects.

Conclusion
This article has described a framework for analysis of such governmental web site designs from a learner perspective – the first time this has been done. It has identified five types of customer values that cyber governmental services can provide. It also presents a matrix of learning processes versus customer values. In addition, the

findings of this study point to several implications for e-government web site design and for future studies and these have been elaborated. The framework shows areas where preferences of learners are and they should aid webmasters in developing better governmental web sites.

References

Anderson, R.C. (1977), "The notion of schemata and the educational enterprise", in Anderson, W.E., Spiro, R.J. and Montague, W.E. (Eds), *Schooling and the Acquisition of Knowledge*, Lawrence Erlbaum Associates, Hillsdale, NJ, pp. 415-31.

Angehrn, A. (1997), "Designing mature internet business strategies: the ICDT model", *European Management Journal*, Vol. 15 No. 4, pp. 361-9.

Apte, V., Hansen, T. and Reeser, P. (2003), "Performance comparison of dynamic web platforms", *Computer Communications*, Vol. 26 No. 8, pp. 888-98.

BOFT (2007), available at http://eweb.trade.gov.tw/content.asp?CuItem = 14471&baseDSD = 5&CtUnit = 187 (accessed November 13, 2006).

Chalmeta, R. (2006), "Methodology for customer relationship management", *The Journal of Systems and Software*, Vol. 79 No. 7, pp. 1015-24.

Chen, Q. and Wells, W.D. (1999), "Attitude toward the site", *Journal of Advertising Research*, Vol. 39 No. 5, pp. 27-37.

Chiu, H.C., Hsieh, Y.C. and Kao, C.Y. (2005), "Web site quality and customer's behavioural intention: an exploratory study of the role of information asymmetry", *Total Quality Management*, Vol. 16 No. 2, pp. 185-97.

Deek, F.P. and Espinosa, I. (2005), "An evolving approach to learning problem solving and program development: the distributed learning model", *International Journal on ELearning*, Vol. 4 No. 4, pp. 409-26.

Dias, G.P. and Rafael, J.A. (2007), "A simple model and a distributed architecture for realizing one-stop e-government", *Electronic Commerce Research and Applications*, Vol. 6 No. 1, pp. 81-90.

Ducoffe, R.H. (1996), "Advertising value and advertising on the web", *Journal of Advertising Research*, Vol. 36 No. 5, pp. 21-35.

Fang, X. and Holsapple, C. (2003), "Web site design for knowledge acquisition: issues, progress, and needs", *Quarterly Journal of Electronic Commerce*, Vol. 1 No. 2, pp. 211-44.

Fu, J.R., Farn, C.K. and Chao, W.P. (2006), "Acceptance of electronic tax filing: a study of taxpayer intentions", *Information & Management*, Vol. 43 No. 1, pp. 109-26.

Ghaoui, C. (2000), "Document icon bar for the support of authoring, learning and navigation on the web: usability issues", *European Journal of Engineering Education*, Vol. 23 No. 4, pp. 455-75.

Glassey, O. (2004), "Developing a one-stop government data model", *Government Information Quarterly*, Vol. 21 No. 2, pp. 156-69.

Hillier, M. (2003), "The role of cultural context in multilingual web site usability", *Journal of. Electronic Commerce Research and Applications*, Vol. 2 No. 1, pp. 2-14.

Huang, C.J. and Chao, M.H. (2001), "Manging WWW in public administration: uses and misuses", *Government Information Quarterly*, Vol. 18 No. 4, pp. 357-73.

Huizingh, E.K. (2000), "The content and design of web sites: an empirical study", *Information and Management*, Vol. 37 No. 3, pp. 123-34.

Jaeger, P.T. and Thompson, K.M. (2004), "Social information behavior and the democratic process: information poverty, normative behavior, and electronic government in the United States", *Library & Information Science Research*, Vol. 26 No. 1, pp. 94-107.

King, S.F. (2007), "Citizens as customers: exploring the future of CRM in UK local government", *Government Information Quarterly*, Vol. 24 No. 1, pp. 47-63.

Lee, M.K.O., Cheung, C.M.K. and Chen, Z. (2005), "Acceptance of internet-based learning medium: the role of extrinsic and intrinsic motivation", *Information & Management*, Vol. 42 No. 8, pp. 1095-104.

Marzano, R.J., Brandt, R.S., Hughes, C.S., Jones, B.F., Presseisen, B.Z., Rankin, S.C. and Suhor, C. (1988), *Dimensions of Thinking: A Framework for Curriculum and Instruction*, Association for Supervision and Curriculum Development, Alexandria, VA.

Nonaka, I. and Takeuchi, H. (1995), *The Knowledge-creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press, New York, NY.

Okamoto, T. (2005), "The future direction on e-learning technologies and e-pedagogy", *Advanced Technology for Learning*, Vol. 2 No. 3, pp. 115-22.

Pu, H.T. and Yang, C. (2003), "Enriching user-oriented class associations for library classification schemes", *The Electronic Library*, Vol. 21 No. 2, pp. 130-41.

Rice, M. (1997), "What makes users revisit a web site", *Marketing News*, Vol. 31 No. 6, pp. 12-13.

Richard, M.O. (2005), "Modeling the impact of internet atmospherics on surfer behavior", *Journal of Business Research*, Vol. 58 No. 12, pp. 1632-42.

Robins, D. and Kelsey, S. (2002), "Analysis of web-based information architecture in a university library: navigating for known items", *Information Technology and Libraries*, Vol. 21 No. 4, pp. 158-69.

Rosenberg, M.J. (2001), *E-learning: Strategies for Delivering Knowledge in the Digital Age*, McGraw-Hill, New York, NY.

Rumelhart, D.E. (1980), "Schemata: the building blocks of cognition", in Spiro, R.J., Bruce, B.C. and Brewer, W.F. (Eds), *Theoretical Issues in Reading Comprehension*, Lawrence Erlbaum Associates, Hillsdale, NJ, pp. 33-58.

Saltzberg, S. and Polyson, S. (1995), "Distributed learning on the world wide web", *Syllabus*, Vol. 9 No. 1, pp. 10-12.

Sepic, R. and Kase, K. (2002), "The national biological information infrastructure as an E-government tool", *Government Information Quarterly*, Vol. 19 No. 3, pp. 407-24.

Song, L., Singleton, E.S., Hill, J.R. and Koh, M.H. (2004), "Improving online learning: student perceptions of useful and challenging characteristics", *Internet and Higher Education*, Vol. 7 No. 1, pp. 59-70.

Strauss, A. and Corbin, J. (1990), *Basics of Qualitative Research*, Sage Publications, Newbury Park, CA.

Wagner, C. and Bolloju, N. (2005), "Supporting knowledge management in organizations with conversational technologies: discussion forums, weblogs and wikis", *Journal of Database Management*, Vol. 16 No. 2, pp. 1-8.

Wan, H.A. (2000), "Opportunities to enhance a commercial web site", *Information & Management*, Vol. 38 No. 1, pp. 15-21.

Watson, R.T., Pitt, L.F. and Kavan, C.B. (1998), "Measuring information systems service quality: lessons from two longitudinal case studies", *MIS Quarterly*, Vol. 22 No. 1, pp. 61-79.

West, D.W. (2006), "Global e-Government", Center for Public Policy, Brown University, Providence, RI, available at: www.insidepolitics.org/egovt06int.pdf

Yang, C., Chen, L.C. and Pen, C.Y. (2006), "Developing and evaluating an IT specification extraction system", *The Electronic Library*, Vol. 24 No. 6, pp. 832-46.

Yin, R.K. (2002), *Case Study Research*, 3rd ed., Sage Publications, Thousand Oaks, CA.

Further reading

Xiong, J.N. (2006), "Current status and needs of Chinese e-government users", *The Electronic Library*, Vol. 24 No. 6, pp. 747-62.

About the authors

Jen-Hung Huang is a Professor at the Department of Management Science, National Chiao Tung University. His research and teaching interests include internet marketing and marketing research. He has published articles in various journals, including *Journal of Economic Psychology*, *Psychology & Marketing*, *Computers in Human Behavior*, *Tourism Management*.

Stacy Huey-Pyng Shyu obtained her PhD degree in 2007 from the Department of Management Science, National Chiao Tung University, Taiwan. In January 2008 she became an Assistant Professor at the International College, Ming Chuan University, Taoyuan, Taiwan, where she is teaching courses in English to foreign students in the fields of Marketing Management, Practice in International Trade, and International Business and Management. Prior to that she was a lecturer in the School of International Business Administration, China Institute of Technology, Taiwan. Her research interests include strategic planning and marketing aspects of e-commerce. Stacy Huey-Pyng Shyu is the corresponding author and can be contacted at: stacyshyu@gmail.com