A hybrid fuzzy MCDM approach for evaluating website quality of professional accounting firms

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ABSTRACT

Due to the popularity of internet, the CPAs can develop websites that properly deliver professional information and represent their firms. Effective use of CPA firm websites can increase communication with existing clients and attract potential clients. This study aims to build a hybrid approach that combines the fuzzy analytic network process (FANP) and fuzzy VlseKriterijumska Optimizacija I Kompromisno Resenje (FVIKOR) for evaluating website quality of the top-four CPA firms in Taiwan and provide worthwhile recommendations for enhancing website design and content. The results show that CPA firms included in this study do not utilize the Internet to its full potential and need to improve their websites. Deloitte has the best overall performance, follow by PricewaterhouseCoopers, Ernst & Young, and KPMG. Additionally, the top-five evaluation criteria in order of importance are richness, understandability, assurance, relevance, and reliability. Therefore, the findings of this study can help CPAs identify the strengths and weaknesses of their own websites and in comparison with those of their competitors, and then make resource allocation decisions about how to improve the status quo and achieve ideal websites.

1. Introduction

The professional service firms, such as certified public accountant (CPA) firms, are knowledge-intensive businesses. CPA firms prepare, maintain and/or review their clients' financial statements and records. They also assist clients with the calculation of taxes and the submission of tax returns. Recent advances in communication and technology have enhanced the accounting profession's capability to communicate with broader viewers (Janvrin, Gary, & Clem, 2009). Many CPA firms use dedicated websites to present their image and as a promotional tool to share information with current and potential clients, prospective employees, and other third parties (Elfrink, 2002; Luthy & Carver, 2004). In addition, they also provide updated accounting trends and regulations, conduct online seminars on international specialty areas, run Q&A sessions, or offer free consulting services (Borgia & Shrager, 2000). Effective use of a website can enhance public recognition, build brand image, improve service to existing clients, supply information to potential employees, and reduce the time and effort required to acquire profitable new clients (Clikeman, Smith, & Walden, 1998; Elfrink, 2002; Roxas, Peek, Peek, & Hagemann, 2000). However,

too many CPA home pages are cluttered, contain more narratives than necessary, or send the incorrect message (Teleki, 2007). Therefore, it is important for CPAs to measure their websites' quality level and to make resource allocation decisions about how to improve the status quo and achieve ideal websites.

In line with the multi-dimensional characteristics of website quality, the problem is a kind of multi-criteria decision-making (MCDM) problems, which requires MCDM methods for achieving an effective problem-solving system. MCDM provides a framework for an inter-websites comparison involving the evaluation of multi-criteria (Bilsel, Büyüközkan, & Ruan, 2006; Büyüközkan, Ruan, & Feyzioğlu, 2007). Several traditional MCDM methods are based on the additive concept along with the independence assumption where each individual criterion is not always completely independent (Leung, Hui, & Zheng, 2003; Wu & Lee, 2007). Hence, an analytic network process (ANP) was developed by Saaty (1996) to overcome the problem of dependence and feedback among criteria. Recently, a compromise ranking method, namely the VlseKriterijumska Optimizacija I Kompromisno Resenje (VIKOR) method, has been introduced as an applicable technique for implementation within MCDM (Opricovic & Tzeng, 2004; Tzeng, Lin, & Opricovic, 2005). It introduces an aggregating function based on the particular measure of closeness to the ideal solution (Opricovic & Tzeng, 2004). In reality, exact numerical values may not always be adequate to present the decision-making process, since human perception, judgment, intuition, and preference remain vague and

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difficult to measure. Fuzzy logic, or fuzzy set theory (Zadeh, 1965) is a way of addressing vague concepts and provides a means for representing uncertainty in order to handle the vagueness involved in the real situation (Chen & Wang, 2009). Therefore, the purpose of this study is to provide a more effective approach for evaluating website quality of the CPA firms. Specifically, the study proposes a hybrid MCDM approach combining fuzzy ANP and fuzzy VIKOR to deal with imprecise, uncertain, and complex decision-making problems and then to determine the preferable compromise rank from a set of alternatives. For the determination of the relative importance of evaluation criteria, fuzzy ANP is used since it is based on pair-wise comparisons and allows the utilization of linguistic variables. Then, the weights obtained through fuzzy ANP are combined with fuzzy VIKOR to compute weighted gap between the status quo and the ideal point for websites. In fuzzy ANP and fuzzy VIKOR, linguistic preferences can be converted to fuzzy numbers. Furthermore, in order to verify the practicality and usefulness of this hybrid evaluation approach, an empirical study of the top-four CPA firm websites in Taiwan is offered to illustrate the application of the proposed approach. The findings of this study can help CPAs form a clear picture of their websites' quality level and then prioritize the strategies for improvement. Hence, this hybrid fuzzy MCDM approach represents an effective tool for evaluating CPA firm websites.

2. The concept of website quality

2.1. Accounting firm website evaluation

There are a few articles with regard to accounting firm websites in the literature. Clikeman et al. (1998) demonstrated how to design an accounting firm website and examined 131 small and medium-sized accounting firm websites. The authors indicated that an interesting and effective website should include various key features, such as mission statement, description of service and employment opportunities, biographies of partners, free information, electronic forms for inquiries, and ease of navigation. In addition, the findings showed these websites performed poorly in online guest book, search engine for website, music or other audio, client testimonials, and links to client. Roxas et al. (2000) conducted a content analysis of the web pages of 346 accounting firms in terms of client choice factors, search engine and directories registration, value added features, and graphics. The researchers suggested that accounting firms must register their websites with search engines that are commonly available and must encourage more interactivity with existing and potential clients by providing free information such as newsletters and linkages to relevant websites. The studies of Clikeman et al. (1998) and Roxas et al. (2000) identified the existence of certain website characteristics. These characteristics, however, may not indicate the ease of use of the site. Clikeman and Walden (1998) surveyed 56 small- and medium-sized accounting firms on their Internet marketing experiences. The finding indicated that the main motivations for developing websites were keeping up with technology and attracting new clients. Chen, Tseng, and Chang (2005) explored the internet applications of 73 accounting firms in Taiwan. The researchers found that approximately half of the accounting firms had started to use the internet in business related activities and the main reasons for implementing the internet were sharing internal resources, enforcing communication with clients and cost saving. Luthy and Carver (2004) explored the cyber presence and on-line activities of the "Big Four" accounting firms in the USA and offered a critique of each site's strengths and weaknesses as a benchmark for other accounting firms' cyber efforts. They only reviewed the websites to see if there were any substantial problem in navigability, usability, and con-

tent. Janvrin et al. (2009) examined the perceptions of 12 professional accounting association websites from the perspective of college students using an empirically validated instrument. The finding indicated that both beginning college students and accounting majors perceived that these websites were effective in providing accounting career information. The researchers examined user satisfaction using a seven-point Likert scale from strongly disagree to strongly agree, but did not have provide a clear picture of overall website's quality level in numerical scores.

The above discussion identifies a gap in the literature as to how CPAs will appropriately measure their websites' quality by a comprehensive and systematic MCDM approach. It is important to bridge this gap and address CPAs' concerns.

2.2. Website quality

Quality is a characteristic of a product or service that reflects how well it meets the needs of its consumers (Nagel & Cilliers, 1990). Madu and Madu (2002) have noted that dimensions of e-quality may be different from the traditional practice of quality. Aladwani and Palvia (2002) considered Web quality to be a complex thing and multi-dimensional measurement in nature. DeLone and McLean's updated information systems (IS) success model (2003) consists of three quality factors: information quality, system quality, and service quality. The three quality factors of a website will play an important role in affecting the users' perceptions (Cao, Zhang, & Seydel, 2005). The details of each quality factor are described below.

System quality is not only a measure of the information processing system itself but also an engineering-oriented performance characteristic (Ahn, Ryu, & Han, 2007; Negash, Ryan, & Igbaria, 2003). High level of system quality may provide users with more convenience, privacy, and faster responses (Ahn et al., 2007). System quality can be measured using accessibility, navigability, usability, and privacy. Accessibility evaluates whether information can be accessed efficiently, and whether the site can be located using standard resource discovery tools (Smith, 2001). Accessibility is also the ability of the website to be accessed by disabled users (Mohanty, Seth, & Mukadam, 2007). Navigability measures how easy it is for users to access the information they want on the websites, including standard menu structure, home-page links, standard page design, search engines and directories, and the indication of user position in the menu structure (Han & Mills, 2006; Schmidt, Cantallops, & dos Santos, 2008; Smith, 2001). Usability is a quality or attribute that represents how easy user interfaces are to use and how quick they are in helping users perform tasks (Nielsen, 2003). Website usability is concerned with how easy and intuitive it is for personals to learn to use and interact with a website in order to quickly and easily accomplish their tasks (Preece, 2001). Privacy refers to the extent to which users' privacy rights are protected, privacy and security policies are clearly disclosed, and exchanges of information with users are encrypted (Smith, 2001).

Information quality is the quality of the information produced and delivered by a system (Lee & Kozar, 2006). If the system does not provide the needed information, users will be dissatisfied and then leave it (Bai, Law, & Wen, 2008). However, having useful and updated information keeps a client visiting the website (Roxas et al., 2000). To entice users to revisit, the website needs to provide with appropriate, complete and clear information (DeLone & McLean, 2003). Typical characteristics of information quality include relevance, understandability, richness, and currency. Relevance refers to the extent to which the information on the website is related to the information needs of the user. Different parts of the website should be designed to meet the needs of different group of visitors (Cao et al., 2005), such as accountants, general visitors, researchers, and students. Understandability refers to ease of understanding and clearness of the information (Lee & Kozar,