EXAMINING THE IMPACTS OF WEBSITE COMPLEXITIES ON USER SATISFACTION BASED ON THE TASK-TECHNOLOGY FIT MODEL: AN EXPERIMENTAL RESEARCH USING AN EYETRACKING DEVICE

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EXAMINING THE IMPACTS OF WEBSITE COMPLEXITIES ON USER SATISFACTION BASED ON THE TASK-TECHNOLOGY FIT MODEL: AN EXPERIMENTAL RESEARCH USING AN EYE-TRACKING DEVICE

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Abstract

To get insights into how Internet users perceive the quality and user-friendliness of website design, this study intend to conduct a controlled experiment using an eye-tracking device to examine the effects of different levels of the three primary features of website complexity, namely the component, coordinative, and dynamic complexities on the satisfaction and intentions to reuse of website users. Additionally, in conjunction with the concept of website complexities, the task-technology fit theory (TTF) is adopted to develop a research framework to understand the behaviors of the website users. It is expected that the lower the users’ perceptions of website complexities will result in higher perception of the fit between a website and the tasks that the users intend to accomplish via the use of the website, which, in turn, may lead to higher user satisfaction and intend to reuse the website. Additionally, Internet users’ levels of technology readiness, familiarity, and online task characteristics are expected to have a significant moderating effect on the relationships between website complexities and the perceived level of task-technology fit. The research results are expected to provide insights into the relationships among website complexities, user satisfaction, and intention to reuse the websites.

Keywords: Website complexity, eye-tracking experiment, task-technology fit theory, user familiarity, technology readiness.
INTRODUCTION

The advance of the Internet and other technologies facilitates convenient and low-cost transactions and social activities via a variety of online mechanisms. Conducting transactions and/or interacting with other people via websites have rapidly become an essential part of many people’s lives. However, electronic commerce (e-commerce) professionals find it increasingly difficult to motivate online users to stick to a specific website and to prevent them from switching to other websites that provide similar products/services for a variety of reasons, including low entry barriers and a high diffusion rate of market information. With the growing interest in conducting a variety of social activities online, significant efforts have been made to develop and examine criteria and models to evaluate the performance and success of websites from technical/information system (IS) and/or transactional perspectives (Chau et al. 2007; Hsieh & Lin 2012; Jarvelainen 2007; Lu et al. 2010; Wang 2008).

From a technical perspective, Internet users visit websites for achieving diverse kinds of purposes that require effective identification, screening, and comprehension of a huge amount of information, which tend to be presented in various formats, in order to help the users make appropriate decisions. Consequently, how well a website designs its user interfaces to assist its users to locate and review critical information in an efficient manner is very important to the long-term prosperity of the website. Complex interface design of the websites may result in visual confusion and cognitive dissonance of the website users and consequently, increase the users’ difficulty in accomplishing their online tasks effectively. Thus, making good user impression on the quality of the websites by achieving plain and elegant website design to facilitate convenient and effort-free website use experience of the Internet users is no double a key to favorable levels of user satisfaction and high user retention rates (Agarwal & Venkatesh 2002; D'Angelo & Little 1998; Singh & Dalal 1999).

Among the factors that influence users’ perceptions regarding the quality of the design of websites, perceived website complexity is one of the most important but under-researched element. By consolidating the findings of prior studies, Nadkarni and Gupta (2007) identify three primary dimensions of website complexity, namely the component, coordinative, and dynamic complexities. A few noticeable existing works on website complexity indicate that the levels of website complexities are significantly related to the communication effectiveness between online content providers/websites and the website users, and are thus critical to continuing to hold website users’ attention to the websites (Geissler et al. 2001; Ngo et al. 2003; Pandir & Knight 2006; Tuch et al. 2009). Given the contributions of prior studies on perceived website complexity, studies that specifically focus on investigating issues related to website complexity and its relationships with user behaviors (e.g., user satisfaction and intention to reuse the website) using an eye-tracking experimental research design are scarce.

Consequently, this study aims to enrich our understanding of how website complexities impact user satisfaction and user retention rates by conducting an experiment using an eye-tracking device to examine how different complexities can influence user perceptions regarding the quality of website design. Additionally, the task-technology fit theory (TTF) is adopted as the theoretical base to develop a comprehensive research model that depicts the effects of website complexities, in conjunction with other key factors affecting user perceptions, on user satisfaction and intention to use the websites.

RESEARCH BACKGROUND AND RESEARCH MODEL

By consolidating the findings of prior studies, Nadkarni and Gupta (2007) identify three primary dimensions of website complexity, namely the component, coordinative, and dynamic complexities. These authors further indicate that component complexity refers to the users’ perceptions of the density and dissimilarity of information cues in the task stimulus (Berlyne, 1970; Campbell, 1988). “A task stimulus with dense and dissimilar information cues is perceived as more complex than one with sparse information cues” (Nadkarni and Gupta 2007, p. 503). A website is considered having a
high level of component complexity if it has long text, many pictures/images, many colors, and varied formats of presenting information and other visual components. Additionally, coordinative complexity refers to users’ perceptions of the range of and interdependencies among different information clusters in the task stimulus (Campbell 1988; Steinmann 1976). A website is perceived having a high level of coordinative complexity if it has a relatively wider range of information clusters and more interrelationships among these clusters. Finally, dynamic complexity refers to the ambiguity and uncertainty that users face in performing a task via the use of a website (Campbell 1988; Wood 1986). Users tend to perceive a website as having a high level of dynamic complexity if the website presents many ambiguous hyperlinks, less intuitive search procedures, and unpredictable click streams.

Additionally, to establish a solid theoretical base for investigating the impact of perceived website complexities on website users’ behaviors, the task-technology fit theory (TTF) (Goodhue & Thompson 1995), which is popular among information systems (IS) researchers, is adopted in this study to help to develop comprehensive theoretical models for explaining and predicting the relationships between perceived website complexities and user behavioral factors, namely user satisfaction and intention to reuse the website. The central premise of the TTF is the emphasis of the fit between the characteristics of the technology/system/website to be used and characteristics of the task to be performed via the use of the technology. In other words, when a technology possesses features that fit the needs/requirements of the task to be accomplished, the fit has a positive influence on the work performance and, sometimes, degree of subsequent utilization/use of the technology (Crabbe et al. 2009; Zhou et al. 2010). Goodhue and Thompson (1995) further refine the original TTF by considering the influence of individual characteristics on the fit and by further considering the precursors of utilization based on the context under investigation. This refined model is referred to as the technology-to-performance chain (see Figure 1).
technology characteristics, we adopt the component, coordinative, and dynamic complexities as the key technology elements in order to be in line with our primary research aim. Additionally, we expect to examine user perceptions under two kinds of tasks, random web surfing and specific goal achieving, in order to capture the effect of task characteristics on the overall fit of technology (i.e., website) use. Finally, to incorporate the concept of individual characteristics, the concepts of user familiarity and technology readiness are adopted in this study based on the results of a preliminary literature review. User familiarity refers to an individual’s familiarity with the task stimulus and/or task domain (Campbell 1988). Nadkarni and Gupta (2007) argue that user familiarity can increase users’ tolerance of complexity by helping them to distinguish relevant from irrelevant information and by enabling them to better comprehend the connections among elements of the task stimulus. Technology readiness refers to people’s tendency to appreciate and use new technologies for achieving objectives in both private/personal and work/professional areas (Parasuraman 2000). Parasuraman states that technology readiness represents an individual’s overall state of mind, as a result of prior technology use experience, that helps to determine the individual’s predisposition to use new technologies. This argument implies the significant influencing power of technology readiness on individuals’ satisfaction and intention to use a specific technology. Finally, to incorporate the concept of performance impact proposed in the TTF, we include user satisfaction and intention to reuse the website as the proxies of the performance of technology use, as did in prior studies that adopt the TTF and/or technology-to-performance chain (Lin & Huang 2010; Lin 2012; Närman et al. 2012; Parkes 2013; Zhou et al. 2010). The associated research hypotheses are presented, as follows:

H1a: User familiarity positively influences task-technology fit.
H1b: Technology readiness positively influences task-technology fit.
H2: Perceived component complexity negatively influences task-technology fit.
H3: Perceived coordinative complexity negatively influences task-technology fit.
H4: Perceived dynamic complexity negatively influences task-technology fit.
H5: The degree of the specificity of online task goals positively influences task-technology fit.
H6a: Task-technology fit positively influences user satisfaction.
H6b: Task-technology fit positively influences intention to use.
H7: User familiarity negatively moderates the negative influences of the three complexity factors on task-technology fit.
H8: Technology readiness negatively moderates the negative influences of the three complexity factors on task-technology fit.
3 METHODOLOGY

In this study, we plan to implement three research and analysis methodologies, namely quantitative survey analysis, qualitative interview analysis, and eye-tracking (experimental design) analysis to collect and analyze data in order to validate the proposed research model. Cyr et al. (2009) indicate the advantages of adopting the multi-method research approach, as follows. First, while questionnaire data helps to indicate the statistical significance of the research findings, interview data can provide additional perspectives in terms of comprehending how website users perceive website complexities in different task modes, and thus can provide researchers with more information for developing and explaining the rational of the research findings. Additionally, researchers often question the accuracy of the survey data, because this kind of data is acquired primarily by the self-report of the research participants, and thus may suffer from subjective biases. The data collected directly by the eye-tracking devices using well-developed, rigorous experimental procedures are relatively more accurate and objective than the survey data, and thus can provide researchers with complementary perspective to interpret and consolidate the research findings with those acquired using survey data.

With regard to the data analysis, we expect to use the ANOVA and covariance-based structural equation modeling techniques as the primary statistical tools for analyzing both the eye-movement data collected using the eye-tracking devices in the experimental procedures and the self-reported data collected using questionnaires distributed during the experiments to validate the proposed research model. The data collected from the interviews with the individual research participants will be analyzed using the qualitative method that is called the grounded theory (Strauss & Corbin 1997) in order to helps us to better interpret the findings of the data analysis using statistical procedures.

With regard to the data collection, we will develop an experimental procedure to collect eye-tracking data and the associated survey and interview data. We plan to recruit 120 participants for the formal experimental procedures. The experiments are developed using a 3-by-2-by-2 design (i.e., three website complexities with two complexity-related levels and two types of task stimuli for the participants, as discussed previously). Consequently, there will be 12 scenarios for the experimental
procedures. The recruited research participants will be asked to view the six websites selected based on their characteristics in terms of the three identified website complexities and perform two task assignments by using each of the websites assigned to them. The participants will wear an eye-tracking headset device while viewing the websites to perform the required task assignments in order to collect data of their eye movement. After the participants complete an assignment in one particular experimental scenario, they will be asked to complete a questionnaire based on their use experience. This process will eventually yield a sample of 1,440 cases. In addition to the survey, members of the research team will conduct a brief personal interview (10 to 15 minutes) with each participant in order to acquire qualitative data regarding the participant’s perceptions regarding the research.

To select the websites that are appropriate to use as the research instruments for our experiments, a list of 100 most popular websites in Taiwan has been acquired. We expect to recruit 50 participants for the pilot study that aim to determine the features of the candidate websites based on the websites’ propensity of complexities in an objective manner. Every participant for the pilot study will first view 30 websites selected by the members of research team based on the criteria identified in the literature, and then fill out a survey for each of the website that she or he reviewed regarding the complexity features of the website. Details of the qualification of the research participants for the pilot study and the formal experimental procedures as well as the final data collection and analysis methods and procedures will be developed in the subsequent progress of this research project.

4 ANTICIPATED ACHIEVEMENTS

By simultaneously using the eye-tracking experiment and self-report survey approaches, we intend to integrate the concepts of perceived website complexities with the TTF in order to accomplish the following three primary research purposes. First, we intend to give a better understanding of what indicators/measures of eye movement patterns of the Internet users are associated with component, coordinative, and dynamic website complexities, individually. Second, we aim to explore the answers to the question of what the direct and indirect influences of three identified website complexities are on the user perceived task-technology fit and, consequently, on the user satisfaction and users’ intention to reuse the websites. Finally, we plan to investigate the moderating effect of the personal characteristics of users (i.e., technology readiness and user familiarity) and task characteristics (i.e., level of the specificity of the online goals) on the relationships between the three kinds of website complexity and user perceived degree of task-technology fit. The results of this study is expected to significantly contribute to the current understanding of the relationships between the website design, in terms of different categories of complexities, and user satisfaction and intention to reuse the websites.

5 CONCLUSION

Due to the increasing competition of thriving online markets, attempts to prevent consumers from switching to competitors have drawn significant attention from electronic commerce professionals. Effective visual design of websites can enhance physical/visual attractiveness and emotional appeal of the websites to the website users. To get insights into how Internet users perceive the quality and user-friendliness of website design in terms of different categories of website complexities, this study intend to conduct a controlled experiment using a questionnaire, interviews, and eye-tracking methodology. For conducting the experiments of this study, six conditions of website appearance developed by manipulating both high and low levels of the three primary features of website complexity, namely the component, coordinative, and dynamic complexities. The perceptions of research participants regarding the website complexity in the six experimental conditions were recorded and measured using both data collected from the use of eye-tracking device and self-report survey. Additionally, in conjunction with the concept of website complexities, the theory of TTF is
adopted in this study as the theoretical base to develop our research frameworks to understand Internet users’ behaviors regarding the use of the websites from a comprehensive viewpoint. It is expected that the lower the users’ perceptions of website complexities will result in higher perception of the fit between the technology (i.e., website design) and the tasks that the users intend to accomplish via the use of the websites, which, in turn, may lead to higher user satisfaction and intend to continue to use the websites. Additionally, Internet users’ levels of technology readiness and the characteristics of online tasks, which are adopted based on the TTF are expected to have a significant moderating effect on the relationships between website complexities and the perceived level of task-technology fit. In summary, by validating the proposed research models using data collected from both eye-tracking experiments and self-report survey, it is expected that the results of this study can provide insights into the relationships between the website design, in terms of different categories of complexities, and user satisfaction and intention to reuse the websites.

References


