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An Examination of Internet Effectiveness for Non-work Activities

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ABSTRACT

The Internet is frequently used for non-work activities. When used for these purposes, the effectiveness of the Internet in accomplishing these leisure activities becomes an important consideration. Research literature has remained relatively silent in regards to the examination of accomplishing non-work tasks through the Internet. This study uses Davis' Technology Acceptance Model (TAM) as a basis to predict different types of common user web activities—entertainment, communicating, and information searching. Using Structured Equation Modeling, this paper examines the effectiveness of the Internet in accomplishing non-work activities. In this study, the overall analysis of the survey data suggests that perceived ease of use and perceived usefulness predict all three types of Internet activities. The findings of this study suggest a refinement for constructs in web usage studies and contribute to the expanding of TAM to predict perceived effectiveness of Internet usage.

INTRODUCTION

Although the Internet is an integral part of many businesses, it is also an important part of the lives of many individuals. One study identifies that 35% of a sample indicated they frequently use the Internet for hobby-related purposes, 35% said they frequently use it to keep in touch with people not residing locally, 29% stated they used it for school work, 23% indicated they use it for job-related work, and 17% use it for getting product information (Kraut et al., 1998). In the development and maintenance of websites, it is important to understand the user's perspective. In particular, understanding the way an attitude is formed and how the attitude affects perceptions towards Internet usage is an important area to consider.

The Internet has brought forth new ideas and development in the area of educational, psychological, sociological, and technological research and its impact has been investigated through various model and theories. Technology Acceptance Model (TAM) (Davis et al., 1989) has been used in various settings including predicting Internet usage and other web-based products and services (Jiang et al., 2000; Cheung & Lai, 2000; Zhang & Prybutok, 2003). Although researchers have taken interest in Internet usage activities, much of the previous Internet usage research has employed measures of generic unidimensional instruments of a construct, for instance types of websites accessed (Anandarajan & Simmers, 2001), or the diversity of Web usage with frequency of Internet usage (Armstrong et al., 2000). However, with the broad spectrum of Internet activities that can occur, the unidimensional measure may not be sufficient to address complete concerns about various Web usage activities.

This study attempts to use TAM to examine users' perceived effectiveness of the Internet to accomplish non-work activities. Although other studies use TAM as the predictor of Internet usage, this research attempts to assess the importance of antecedents (perceived ease of use and perceived usefulness) on three types of Internet activities (entertainment, communicating, and information seeking) by addressing two research goals: (1) to investigate the determinants of perceived effectiveness of Internet activities, and (2) to examine and validate the multi-dimensional aspects of these activities.

LITERATURE REVIEW

TAM is a theoretically justified model that was designed by Davis et al. (1989) in order to predict the use of an information system. It is widely accepted that TAM is one of the most useful models in predicting technological usage (Gentry & Calantone, 2002; Davis et al., 1989). TAM focuses on two theoretical constructs—perceived usefulness and perceived ease of use—which are considered to be the most important antecedents of technological usage. The more recent Unified Theory of User Acceptance also highlights the importance of perceived usefulness and perceived ease of use in the affect of user attitudes (Venkatesh, Morris, Davis, & Davis, 2003).

In essence, the research that has been conducted in this area examines various external variables to determine which affect a user's attitude towards use of the information systems, which can be used to predict Internet usage activities. Jiang (2000) applies TAM to Internet use, and shows that utilization of the Internet correlates positively with perceived usefulness, facilitating conditions, and prior experience. Cheung and Lai (2000) study various factors affecting Internet usage in working environments by including facilitating conditions and social factors. A number of research studies have in recent years examined technology usage in settings other than the workplace. For example, Venkatesh and Brown (2001) conducted a study to identify factors driving the adoption of PCs at home. Lee (2003) described how users perceive the features of P2P file-sharing systems. Venkatesh and Vitalari (1992) studied the adoption of personal computers for home use. Kraut et al. (1999) studied Internet usage in households. Kim et al. (2002) investigated PC adoption in homes.

Many empirical studies use TAM as the theoretical basis of user acceptance and adoption of Internet technology (Anandarajan & Simmers, 2001; Cheung & Lai, 2000; Kucuk & Arslan, 2000; Lederer et al., 2000; Ambra & Rice, 2001; D'Ambra & Rice, 2001; Fenech, 1998; Gentry & Calantone, 2002; Liu & Arnett, 2000; Lin & Lu, 2000). Although there are some studies that try to examine the determinants of Internet usage activities through the use of TAM, the measurements are generally based on unidimensional measures of Internet activities. Some unidimensional measurements of Internet usage include frequency of use (Teo & Lim, 1998; Korgaonkar & Wolin, 1999; Teo et al., 1999; Anandarajan et al., 2000), types of web page access (Anandarajan & Simmers, 2001), number of times each particular site is visited (Lederer et al., 2000), or the diversity of Web usage with frequency of Internet usage (Armstrong et al., 2000). Lin and Lu (2000) explain why users accept or reject a website based on the features such as response time and information content.

However, empirical evidence has suggested that Internet usage is a multi-dimensional construct. For example, Lim (2002) used browsing, e-mailing, downloading, purchasing activities as a measure for Internet usage. Greenfield (2001) classified the usage of web sites at work into seven categories based on the frequency of times employees visited certain web sites, namely shopping/auction, investment/stock, chat room/personal, pornography, games, sports, and MP3 sites. Teo et al. (1999) use a multi-dimensional construct of time spent on certain general activities, such as browsing, downloading, messaging, and purchasing. Nevertheless, employing unidimensional Internet usage or generic multi-dimensional aspects of Internet usage may not be adequate to address the broad spectrum of goal-oriented web activities.

The use of the Internet has been studied as both a determinant factor and a consequential factor in various levels of studies. For example, it has been hypothesized as a determinant of both work inefficiency and job satisfaction (Anandarajan et al., 2000), and a dependent variable in belief models (Stevens et al., 2000; Papacharissi and Rubin, 2000). Korgaonkar and Wolin (1999) explored the nature of an Internet user's motivation factors and concerns that lead to Internet usage and found social, transactional, and informational concerns. Although these studies provide the determinants of the motivation of Internet users, they do not lead to standardized measures of Internet activities that focus on the productivity or effectiveness of the Internet pertaining to any particular task. It is important that a new type of Internet usage construct is needed. This study uniquely tries to utilize the multi-dimensional aspects of Internet usage by focusing on user's perceived effectiveness of three main uses of the Internet: entertainment, communicating, and information seeking (Papacharissi & Rubin, 2000; Lippert & Swiercz, 2007; Young, 2005); thereby, contributing to the expansion of TAM to predict other multi-dimensional constructs.

RESEARCH METHODOLOGY

Definition and Operationalization of Research Variables

The items used for Perceived Usefulness, Perceived Ease of Use, and Attitudes towards Internet Use were adapted from Davis et al. (1989). Since this study is examining Internet usage, the definitions of the constructs reflect a user's view of the Internet. The construct *perceived usefulness* is defined as the extent to which a user believes that the use of the Internet is beneficial. *Perceived ease of use* is defined as the extent to which a user believes that Internet use is effortless. *Attitude Towards Use* is defined as a user's perspective of interacting with the Internet. *Perceived Effectiveness* is a construct developed for this study and is defined as the perspective a user has on how productive (effective) the Internet is in accomplishing particular Internet activities. This study examines Perceived Effectiveness as a multi-dimensional construct; this construct was created through the use of various focus groups (D'Ambra & Rice, 2001) and using standard procedures for questionnaire development (Lunt & Livingston, 1996). The focus groups identified three major tasks they use the Internet for (communication, searching for information, and entertainment) and the major reasons why they would choose the Internet to facilitate the task. Based upon the responses of the focus groups, a questionnaire was created. The Appendix shows the Likert-scale measurement items used on the questionnaire. Table 1 below shows descriptive information about each of the variables.

Table 1: Descriptive Statistics and Cronbach's Alphas.

Constructs and Items	Mean	S.D.	Factor Loadings	Cronbach's Alpha
Perceived usefulness (PUSE)				.8930
PUSE1	4.18	.881	.803	
PUSE2	3.98	.823	.698	
PUSE3	4.16	.764	.756	
Perceived ease of use (PEOU)				.8635
PEOU1	4.18	.798	.739	
PEOU2	4.03	.828	.752	
PEOU3	4.35	.737	.748	
PEOU4	4.22	.735	.800	
Attitude (ATT)				.6061
ATT1	4.43	.815	.580	
ATT2	3.62	.975	(drop)	
ATT3	4.11	.911	.749	
Entertainment (ENT)				.7576
ENT1	3.90	1.058	.600	
ENT2	3.36	1.008	.863	
ENT3	3.47	1.083	.873	
Information (INFO)				.8423
INFO1	4.22	.770	.712	
INFO2	4.10	.773	.770	
INFO3	3.70	.906	.774	
INFO4	3.86	.822	.620	
Communication (COMM)				.7980
COMM1	4.24	.992	.790	
COMM2	3.72	1.045	.833	
COMM3	3.94	.916	.833	

Research Model

The determinants of the research model are based on the belief-attitude-behavior representation of TAM (Davis et al., 1989), which has been developed for explaining and predicting user acceptance of computer and Internet technology. Figure 1 shows the proposed research model used in this study.

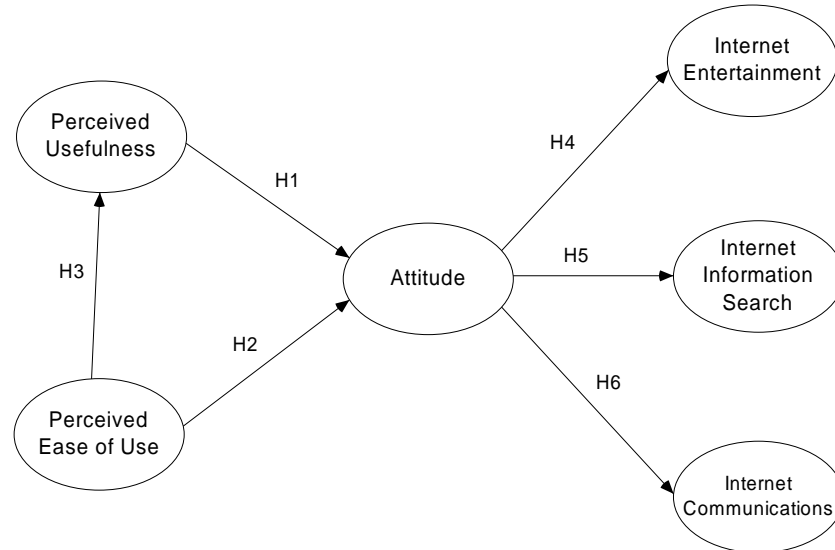


Figure 1: Research Model.

TAM proposes perceived usefulness and perceived ease of use as the two independent variables that have the greatest effect on attitude towards use. There have been various studies that have tested the reliability of TAM. A number of studies (Dishaw & Strong, 1999; D'Ambra & Rice, 2001; Straub et al., 1997; Mathieson, 1991; Cheung & Lai, 2000; Adams et al., 1992) have replicated the work of Davis in the area of ease of use, perceived usefulness, and usage of information technology. Some of the prior studies have focused on the theoretical implications of perceived ease of use and perceived usefulness and tried to extend other possible antecedents of TAM (Karahanna & Straub, 1999; Venkatesh & Davis, 2000). The results of these studies demonstrated that perceived ease of use and perceived usefulness are both important predictors of the other variables in the model. Therefore,

Hypothesis 1: Perceived usefulness is positively related to attitude toward using the Internet.

Hypothesis 2: Perceived ease of use is positively related to attitude toward using the Internet.

Hypothesis 3: Perceived ease of use is positively related to perceived usefulness.

Attitude towards use is also the variable that will ultimately affect actual system use, in which the intentions to perform a behavior is formed by what a person has a positive affect towards (Davis et al., 1989). Attitude toward the behavior is defined as a user's positive and negative beliefs in performing the behavior (Ajzen, 1988). Evidence suggests that a positive attitude toward the computer influences computer usage in general (Klobas, 1995; Davis et al., 1989). If attitude towards the Internet predicts Internet usage, then an individual will use the Internet to achieve his/her desirable outcomes. Therefore, the hypotheses suggest that attitude toward a behavior is the predictor of behavioral intention that will eventually lead to Internet usage.

Hypothesis 4: Attitude toward Internet use is positively related to perceived effectiveness of Internet entertainment activities.

Hypothesis 5: Attitude toward Internet use is positively related to perceived effectiveness of Internet information searching activities.

Hypothesis 6: Attitude toward Internet use is positively related to perceived effectiveness of Internet communications activities.

Data Collection

A user-reported self-assessment approach was used to investigate the hypotheses. The data was collected from undergraduate business students from a large state university in the Midwest. Instructors were contacted and requests were made to distribute the questionnaire in classes. Participation in this research study was strictly optional. The questionnaire was distributed to approximately 250 junior and senior business students with a response rate of 46 percent. There were 116 questionnaires used in this study, composed of 71 percent male and 29 percent female with the majority of the respondents' ages ranging from 20-23 (95 percent). 98 percent of respondents had more than three years of experience with the Internet.

DATA ANALYSIS

The hypothesized relationships in this study were tested using structured equation modeling. This is a second-generation multivariate technique that facilitates testing of the psychometric properties of the scales used to measure a variable, as well as estimation of the parameters of a structural model, i.e., the strength and direction of the relationships among the model variables (Fornell and Larcker, 1981). The use of latent variables requires a two-stage analysis (Anderson and Gerbing, 1988). The first stage includes the assessment of the measurement model and the evaluation of the construct independence, while the second stage provides verification for the structural model.

Measurement Model: Analysis of Measurement Validity

The measurement validity was evaluated through composite reliability and construct validity (Hu et al., 1999). Composite reliability was evaluated using Cronbach's alpha, shown in Table 1. The multi-dimensional Internet usage constructs range from .75 to .84, which were considered well beyond the criterion of an exploratory study (Hair et al., 1998). All other values were above .80, except for attitude toward use (.60). Construct validity can be identified by examining the measurement model through goodness-of-fit measures and χ^2 (Gefen et al., 2000). The measurement model showed a GFI of .865, an AGFI of .803, and an NFI of .867 with χ^2 value significantly smaller in the proposed model (178.4 v. 1341.3). Since GFI and NFI were below the acceptable .9 thresholds, the data supported the convergent and discriminant validity to some extent. Table 1 shows the factor loadings for each of the latent variables. Item loadings are considered acceptable above .5. Each item has a higher loading on its assigned construct than on other constructs, except for item ATT2, which was dropped from the attitude construct. The variance extracted from the constructs range from .54 to .74, exceeding the .50 criterion that suggests that the constructs are distinct and unidimensional (Fornell & Larcker, 1981), except for attitude toward use (.41). Because of ATT2 low factor loading and some of the fit measures failed to satisfy the recommended thresholds, care should be exercised in interpreting the results of the structural model. These results were probably caused by the problem in the measurement of Attitude towards Internet use.

Structural Model Testing and Results

To test the structural model, the path coefficient of an exogenous variable delineates the direct effect of that variable on the endogenous variables. An indirect effect represents the effect of a particular variable (antecedent factor) on the third variable (dependent factors) through its effects on a second mediating variable. It is the product of the path coefficients along an indirect route from cause to effect via arrows in the headed direction only. When more than one indirect path exists, the total indirect effect is their sum. The sum of the direct and indirect effect reflects the total effect of the variable on the endogenous variable.

Several statistics were used to assess the model's goodness of fit. The goodness of fit indices for this model included $\chi^2/df = 1.432$; Goodness of Fit Index (GFI) = .854; Root Mean Square of Approximation (RMSEA) = 0.061; Comparative Fit Index (CFI) = 0.949; Incremental Fit Index (IFI) = .950; and Tucker-Lewis Index (TLI) = .937. All measures yielded moderate to acceptable levels of fit as recommended by Bentler (1990) and Bagozzi and Yi (1988).

The results of the multivariate test of the structural model are presented in Figure 2. Based on the research model, hypothesis 1 was supported with perceived usefulness having significant direct effects on attitude ($\beta = .81, p < .01$). Perceived ease of use had a significant direct effect on attitude ($\beta = .27, p < .01$), and perceived usefulness ($\beta = .68, p < .01$), thus supporting hypothesis 2 and 3. For hypotheses 4 through 6, attitude toward the Internet significantly

supported all three types of perceived effectiveness of Internet activities—entertainment ($\beta = .37, p < .01$), information seeking ($\beta = .38, p < .01$), and communications ($\beta = .74, p < .01$). The model did extraordinary well in explaining 55 percent of the variance in information seeking activity. However, it captured only 13 percent and 14 percent of the variance in entertainment and communication, respectively. In sum, the tests of the structural model showed that the antecedent factors — perceived use of use, perceived usefulness, and attitude toward the Internet, are important factors affecting user's perceived effectiveness of Internet usage activities.

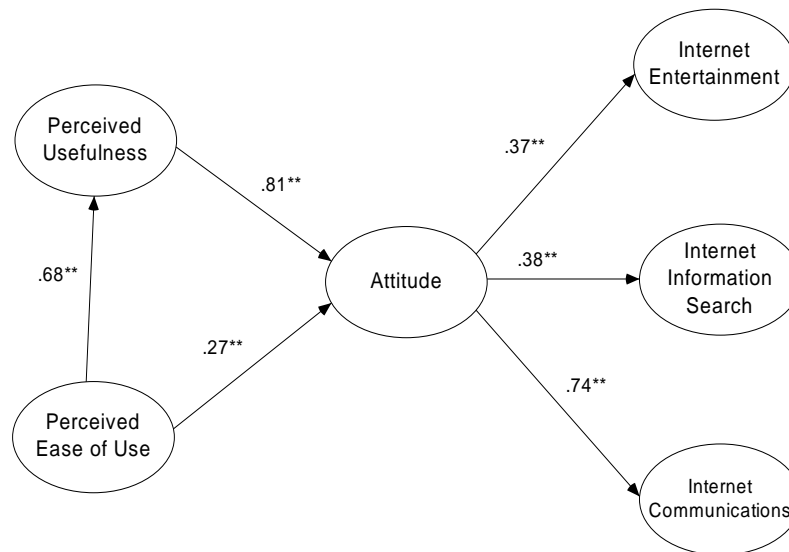


Figure 2: Results from Hypotheses Testing.

DISCUSSION

The results show significant support for all hypotheses in the research model. TAM served as a relevant and useful model in examining the perceived effectiveness of Internet usage to accomplish non-work activities. The results clearly demonstrate that attitude towards use positively affects the perceived effectiveness of various tasks. The research has provided insight into the relationship between the Internet context and the applicability of the TAM through studying distinctly different Internet activities (entertainment, communicating, and information searching).

From the perspective of the effectiveness of Internet activities, the present research expands our understanding of factors influencing Internet user effectiveness. Although many studies have applied and replicated the TAM, studies have not focused on understanding the key constructs of TAM in examining the Internet's perceived effectiveness to accomplish Internet activities. This research has attempted to go beyond the measures of a unidimensional instrument of the construct identified by Venkatesh and Davis (1996).

The findings of this study have three business implications. First of all, consistent with TAM, the perceptions of users' ease of use and usefulness highly affects the attitude of users. As website designers strive to have users return to their sites, one of the critical success factors is to develop a positive user attitude. It is, therefore, very important to create a website that will give users the perception that it is easy to use and useful. Second, users' attitudes towards use definitely affects perceived effectiveness. This attitude is important because user perceptions play an important role in whether or not the user tells others about the website. Third, the model explained a large amount of the variance in information seeking activity (55 percent). The implication of this relationship to Internet search engines and portal sites is that an increase in perceived ease of use and perceived usefulness leads to a higher perceived effectiveness. If designers improve their websites by taking extra efforts centered on perceived usefulness and perceived ease of use of the tasks users have set out to accomplish, there will be a high perceived effectiveness that eventually will lead to widespread usage of the website.

LIMITATIONS

This article is not intended as the final word on measuring the effectiveness of Internet usage. Future research should address shortcomings of this study by enhancing the multi-dimensional construct with new samples. A potential weakness of this study is the limited number of respondents. First of all, because this is an empirical study, the respondents of the questionnaire were business students with an average age of 21. This is not a representative sample of the entire population of Internet users. This study, however, is not intended to represent all users; rather, it is to further the already developed models and to test the applicability of a new Internet construct. Therefore, for the purposes of this study, the sample group was adequate for supplying the needed information to test the proposed model.

Second, although we tried to include various Internet activities into consideration during the feedback obtained through our focus group sessions, the content validity of the dimensions may not have captured all the various underlying perceived effectiveness factors. There is an inherent difficulty in the development of adequate measures that are useful across many environments. This technique is a theory-based approach as questions are derived from various studies in the area of information systems; however, any type of measurement does not necessarily transfer well from one environment to another and needs to be validated in future research.

FUTURE RESEARCH

There are several possible applications for multi-dimensional Internet perception measurements. Since there are large spectrums of activities that can be performed via the Internet, research may attempt to enhance or develop the measure through other empirical investigations. Future research in the field of web usage and productivity will find the measurement useful to investigate Internet activities based on each specific effectiveness dimension, or utilize it as a multi-dimensional construct. Researchers can also investigate the determinants that lead to unproductive versus productive Internet activities in the workplace and the consequences of those behaviors. Furthermore, organizational culture, technological infrastructure, norms, employees' job characteristics, motivation, and work ethics could influence the nature of employees' Internet usage behaviors. At the same time, employees' role, status, and job descriptions may also help researchers predict Internet usage patterns of each employee and advise better filtering and monitoring strategies to fit their jobs. We hope that this research will bring forward new research directions and approaches to investigate and to deal with Internet usage issues.

CONCLUSION

The main objective of this research is to understand the antecedents of Internet usage through the examination of perceived effectiveness among three types of Internet activities. TAM and Structured Equation Modeling are used to examine the measurement model and the structural model. The study shows that TAM predicts those Internet usage activities adequately well. This paper not only tested currently existing TAM theory, but identified tangible ways in which multi-dimensional Internet activities can be utilized, such as providing entertainment, communications, and information search. Acceptance of technology will continue to be an active area of research as new technologies are continually developed and implemented in organizations. This study provides insight into the specific applicability of the TAM to Internet technologies.

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APPENDIX

Perceived Usefulness (PUSE)

- PUSE1. I can accomplish tasks more quickly through the Internet.
- PUSE2. The Internet enhances my effectiveness.
- PUSE3. The Internet makes tasks easier to do.

Perceived Ease of Use (PEOU)

- PEOU1. The Internet is easy to learn.
- PEOU2. My interaction with Internet sites is clear and understandable.
- PEOU3. I find it easy to use the Internet.
- PEOU4. I learned how to use the Internet quickly.

Attitude Toward Use (ATT)

- ATT1. I have a favorable attitude towards using the Internet to accomplish a task.
- ATT2. I experience frustration when using the Internet to accomplish tasks.
- ATT3. If possible, I prefer to use the Internet to accomplish tasks rather than accomplishing the task through non-Internet means.

Entertainment (ENT)

- ENT1. The Internet is effective in providing entertainment.
- ENT2. I make better decisions with my hobbies because of information I get from the Internet.
- ENT3. Because of my web use, I am better informed with my hobbies.

Information Searching (INFO)

- INFO1. The Internet is an effective tool to search for information.

INFO2. The Internet has had a positive impact on my ability to search for information more efficiently.

INFO3. The quality of my work has improved because of using the Internet for finding information.

INFO4. Because of my web use, I am better informed in general.

Communication (COMM)

COMM1. The Internet is an effective tool to communicate with others.

COMM2. The Internet has had a positive impact on my ability to communicate better.

COMM3. I can accomplish things more quickly because of my communicating through the Internet.

