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TAM and the World Wide Web

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Abstract

The purpose of this research-in-progress is to test the Technology Acceptance Model (TAM) with the World Wide Web as the users' application. The investigation will validate, extend, or refute TAM. It will thus help identify guidelines for developing and using Web sites.

Introduction

The World Wide Web has grown phenomenally since its inception in 1990. Zona Research expects the total market for its technologies to grow to \$41 billion by 1999 (Kantor and Neubarth, 1996). Existing organizations, start-up firms, consultants, and end users are now investing considerable resources in it. Thus, an understanding of the factors that determine Web usage could serve a multitude of stakeholders by helping them understand how to promote that usage.

In recent years, researchers have conducted several studies to examine the relationship between perceived ease of use, perceived usefulness, and the usage of other information technologies (Davis, 1989; Davis et al., 1989; Mathieson, 1991; Adams et al., 1992; Szajna, 1996; Hendrickson and Collins, 1996; Chau, 1996). Their research has supported the Technology Acceptance Model (TAM) (Davis, 1989) which posits that perceived ease of use and perceived usefulness can predict the usage of technology. Researchers have validated TAM using several different applications including e-mail, voice mail, word processing, and spreadsheets.

The purpose of this research in progress is to test TAM with the Web as the users' application. It will thus identify features of the Web that can contribute to its ease of use and usefulness.

This investigation will provide important findings and suggest beneficial implications. It will validate, extend, or refute TAM. It will help identify guidelines for developing and using Web sites.

TAM: The Theoretical Background

Davis (1989) has shown that TAM can explain the usage of information technology. He applied Fishbein and Ajzen's (1975) theory of reasoned action to show that beliefs influence attitudes which lead to intentions and therefore generate behaviors. Davis conceived that user acceptance of IT is modeled through TAM on this belief-attitude-intention-behavior relationship.

Davis asserted that perceived usefulness and ease of use represent beliefs leading to such acceptance. Perceived usefulness is the degree to which a person believes that a particular system would enhance his or her job performance (i.e., by reducing the time to accomplish a task or providing timely information). Perceived ease of use is the degree to which a person believes that using a particular system would be free of effort (Davis, 1989).

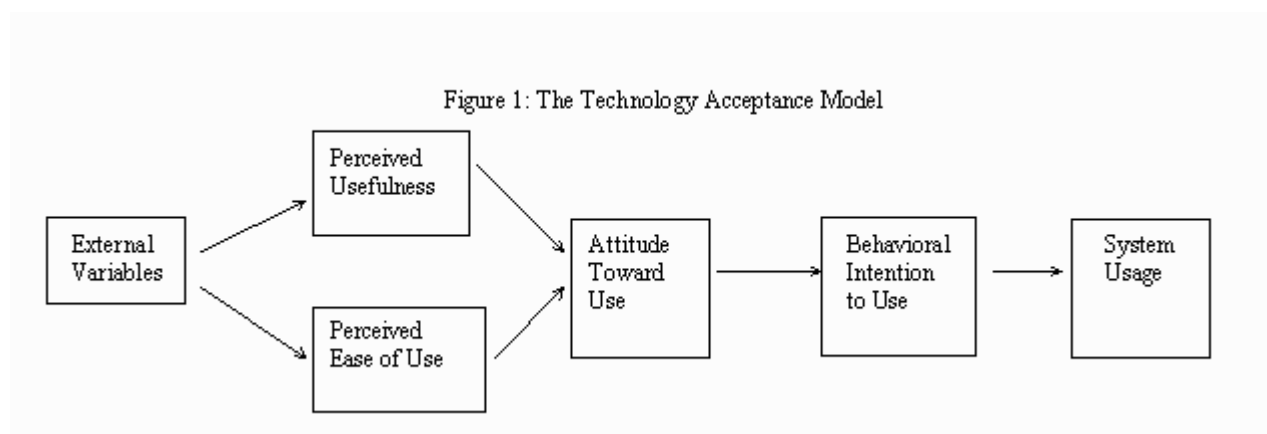
Two other constructs in TAM are attitude towards use and behavioral intention to use. Attitude towards use is the user's evaluation of the desirability of employing a particular information systems application. Behavioral intention to use is a measure of the likelihood a person will employ the application (Ajzen and Fishbein, 1980).

TAM's dependent variable is actual usage. It has typically been a self-reported measure of time or frequency of employing the application.

Davis et al. (1989) also recognized that external variables might influence usefulness and ease of use. Training documentation and user support consultants are examples of such variables. External variables have not been studied empirically.

Figure 1 shows the model. The arrows represent the relationships of interest in the current study. (Some authors have considered additional relationships.)

Such theories and models as self-efficacy theory, cost-benefit research, expectancy theory, innovation research, and channel disposition have supported TAM. Table 1 summarizes several TAM studies in IS research. However, the authors have been unable to locate research that applies TAM to Web ease of use and usefulness.



Ease of Use and Usefulness on the Web

Researchers have discussed features related to the perceived ease of use of the Web. The Graphic, Visualization, and Usability (GVU) Center at the Georgia Institute of Technology has conducted Web user surveys every six months since 1994 (Pitkow and Kehoe, 1996). The results from the most recent survey identified some key ease of use problems. Most frequently cited was the slow speed of downloading or viewing Web pages. Other problems included being unable to find a page that they knew existed, organize the pages and information they gathered, find a page once visited, and visualize where they had been and could go to find information.

A qualitative study raised similar problems (Lightner et al., 1996). Respondents cited slow data access as the issue that they disliked most about the Web. They also cited difficulty searching for specific information, information clutter, time delays due to images, the unreliability of sites, and incomplete category searches.

A third study identified eight usability principles (Levi and Conrad, 1996): speak the users' language (use words, phrases, concepts familiar to the user); consistency (similar concepts, terminology, graphics, layout, etc.); minimize the user's memory load (do not force users to recall information across documents); flexible and efficiency of use (accommodate a range of user sophistication and diverse goals); aesthetic and minimalist design (visually pleasing displays with no irrelevant or distracting information); chunking (short documents with one topic ideally on a single page); progressive levels of detail (organize information hierarchically with general information before specific detail); and navigational feedback (allow user to determine document position). A fourth suggested similar issues (Boling, 1995).

Table 1: Previous TAM Research

AUTHORS	CONSTRUCTS	APPLICATIONS	METHOD- OLOGY	FINDINGS
Davis, 1989	U, EOU, Usage	PROFs, XEDIT, Chart-Master, Pendraw	Survey Experiment	Uusage, EOUusage
Davis et al., 1989	U, EOU, A, BI, Usage	WriteOne	Experiment	EOUU, UA, EOUA, ABI, UBI, BIUsage
Mathieson, 1991	EV, U, EOU, A, BI, Usage	Spreadsheet, Calculator	Experiment	Same as Davis, 1989
Adams et al.,	U, EOU, Usage	E-mail, V-mail,	Survey	EOUUsage,

1992		WordPerfect, 123, Harvard Graphics		UUsage, EOOU
Szajna, 1996	U, EOOU, BI, Usage	E-mail	Experiment	EOUU, UBI, BIUsage
Hendrickson and Collins, 1996	U, EOOU, Usage	1-2-3, WordPerfect	Experiment	EOUU, EOUUsage, UUsage
Chau, 1996	EOU, Near-term U, Long-term U, BI	Word, Excel	Survey	EOUNear term U, EOUBI, Near term ULong term U, Near term UBI, Long term UBI
Legend: A, Attitude; BI, Behavioral intention; EOOU, Ease of Use; U, Usefulness				

Fewer details are available on Web perceived usefulness. The GUV survey listed the most common uses of Web browsers as browsing (79%), followed by entertainment (64%), work (52%), and shopping (11%).

The Lightner et al. (1996) survey identified the amount of information on the Web as the issue most liked by respondents. Another usefulness issue in the survey was the ability to communicate. A final issue that could be considered relevant to Web usefulness is matching a Web site to a user's task (Boling, 1995).

Methodology

The authors are developing an instrument to measure the following components of TAM: perceived ease of use, perceived usefulness, attitude toward use, behavioral intention to use, and actual usage. For simplicity, the research will not consider external variables. The authors are deriving scaled items for ease of use and usefulness from the literature reviewed here, additional literature being sought, and interviews with Web users. The instrument will also adapt items from previous studies for attitude toward use, behavioral intention to use, and actual usage.

The authors will pilot test the instrument with individuals who use the Web for work related purposes. They will focus the subjects by first asking them to consider the Web site they use most often and answer the questions as they pertain to that site.

The authors will then send the instrument to other subjects who similarly use the Web. They will obtain a minimum of 200 responses. They will analyze survey responses using

confirmatory factor analysis to determine reliability and purify the instrument. They will then perform structural equation modeling to examine the relationships between the constructs.

Possible Findings

The authors anticipate that the research will support TAM. However, if it fails to do so, then further analysis of the data may facilitate extending or qualifying TAM.

The research will also identify Web site features that best support perceived ease of use and usefulness. It will thus help identify guidelines for developing and using Web sites. It will also demonstrate the feasibility of studying the Web in order to improve it.

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