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ABSTRACT

The Technology Acceptance Model, popularly known as the TAM, has been widely used in the information systems literature to explain individual adoption of information technology. In the 1990's a number of studies either extended the model by identifying antecedents to technology acceptance or have replicated and validated the model. But few studies have examined the role of organization culture in the acceptance of technology. In this paper, we use the Technology Acceptance Model to examine acceptance of Internet technology in a government agency in India. We examine the role of organizational culture in technology acceptance, that is, we consider organizational culture values to be antecedents of TAM. We found that organizational culture has a significant impact on Internet technology adoption.

Keywords

Technology Acceptance, Organizational culture, Corporate Culture, Internet Adoption

INTRODUCTION

With the Internet now accepted widely as a new medium of communication, public sector organizations are also impacted by it. In this paper we explore the role of culture in the acceptance of Internet technology in an e-government setting in a government agency in India. E-government is described variously as the use of technology to enhance the access to and delivery of government services to benefit citizens, business partners and employees (Turban et al. 2002). The National Association of Software and Services Companies (Nasscom) estimates that the e-governance market in India in 2002 was about Rs 1,400 crores (approx US $300 million). According to Nasscom estimates, state governments and the Central government combined spent $890 million towards e-governance in 2001-02, a number which is expected to reach $6 billion in 2007-08. There are some interesting experiments of e-governance undertaken at States level in India, which bear the testimony as to how IT is being conceived as an important agenda of public administration in India. However, it is long way to go. According to a recently released report by the Center for Public Policy at Brown University (West 2002), India ranked 59th in the order of e-government ranking. According to Gartner Research, only 10 percent of the government bodies around the globe will be able to move towards e-government by 2005.

The role of culture in the acceptance of information technology is important. Culture refers to values and beliefs of individuals within a unit. It is also considered to be the totality of socially transmitted behavior patterns, arts, beliefs, institutions, and all other products of human work and thought characteristic of a community or population (Ein-Dor et al. 1993). The unit could be a nation, organization, profession, functional area or a team. Therefore, depending on the unit, culture can be categorized into different types: national culture, organizational culture, professional culture, functional culture and team culture. Based on our general definition of culture, organizational culture refers to common values and beliefs shared by individuals within an organization and national culture refers to similar shared values by people in a nation or country. Culture plays a unique role in technologies such as the Internet and trans-national or global information systems, systems that provide information and services to individuals and organizations in different countries, with different cultures. In recent years, information systems researchers have started exploring this role of culture in the adoption and diffusion of information systems. Other studies have investigated the role of organizational culture on information systems planning. In short, culture, both organizational and national, is a variable of interest in information system studies. In this paper we focus on organizational culture and its impact on Internet technology adoption and diffusion.

This research paper is organized as follows. In the next section we present a review of literature on information technology adoption. Then, we propose a research model for this study. In the next section on research methodology we describe the sample used, data collection methods and analysis techniques. We present our results in the next section, followed by discussion and conclusion.

LITERATURE REVIEW

The Technology Acceptance Model (Davis et al. 1989; Venkatesh et al. 1996; Venkatesh et al. 2000), popularly known as the TAM, has been widely used in the information systems literature to explain individual adoption of information technology. In the 1990's a number of studies either extended the model by identifying antecedents to technology acceptance or have replicated and validated the model. In the following paragraphs, we present a review of the TAM and organizational culture literature in three parts. First, we present the original TAM and extensions that have been made in recent years. Second, we examine how TAM has been applied to explore information technology adoption in other countries. This is important since we examine information technology adoption in a developing country, India. In the third part, we review literature that has investigated the role of organizational culture in information systems research. We present the TAM literature next.

The Technology Acceptance Model (TAM)

TAM adapted Azjen and Fishbein's (1980) Theory of Reasoned Action (TRA), a theory in the field of social psychology, to model user acceptance of information systems. "The goal of TAM is to provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behavior across a broad rage of end-user computing technologies and user populations…" (Davis et al. 1989, p 985). The TAM uses variables from the TRA to explain an individual's voluntary use of information technology. Davis proposed that perceived ease of use and perceived usefulness are the two factors that affect an individual's attitude towards using technology. Attitude towards using technology affects an individual's intention to use information technology, and this, in turn, influences actual use. After finding limited support in his original model, Davis (1989) dropped the attitude variable, revised the original TAM to include the constructs: perceived ease of use, perceived usefulness, behavioral intention to use, and actual system use (Szajna 1996). Perceived usefulness (PU) is defined as the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context. Perceived ease of use (PEOU) is defined as the degree to which a prospective user expects the target system to be free of effort (Davis et al. 1989). In short, TAM states that PU and PEOU affect behavioral intention to use a system, which in turn affects actual use.

A number of studies have tested the Technology Acceptance Model. Adams et al (1992) validated TAM using two studies. First they examined users' acceptance of two messaging technologies: voice mail and electronic mail. In a second study Adams et al explored the use of three software packages. Their results validated the original scales for the measurement of perceived usefulness and perceived ease of use, and they found support for the original TAM. Szajna (1996) validated TAM using a longitudinal examination of e-mail use by graduate students. Using a pre-implementation and post-implementation approach they found support for the TAM. They also reported high reliability for all the constructs in the model.

Studies have extended the TAM by identifying some external variables that influence perceived ease of use and perceived usefulness in the model. As mentioned earlier, the original TAM was designed to explain voluntary use of technology. Venkatesh and Davis (2000) extended the original TAM to include mandatory uses of information systems as well. This model is referred to as the TAM2 model. Venkatesh and Davis added independent variables such as subjective norm, image, job relevance, output quality, and result demonstrability as independent variables that influence perceived usefulness to the original TAM. Subjective norm was defined as a person's perception that most people who are important to her think she should or should not perform the behavior in question. The relation between subjective norm and perceived usefulness of the system was moderated by experience and voluntary nature of use.

Other external variables that have been studied include intrinsic motivation (Venkatesh 1999), computer self-efficacy, objective usability and experience (Venkatesh et al. 1996). In a combined study that examined all these external factors together, Venkatesh (2000) evaluated determinants of perceived ease of use by using anchors and adjustment-based factors that influence perceived ease of use. Anchors are general beliefs about computers and computer usage, whereas, adjustments are beliefs that are shaped based on direct experience with the target system. This study found that anchors such as control, intrinsic motivation, and emotion are early determinants of the ease of use. Here control was operationalized as computer self-efficacy and facilitating conditions, intrinsic motivation as computer playfulness, and emotion as computer anxiety. All these external variables were found to influence perceived ease of use. This supported an earlier study that concluded, "…an individual's perception of a particular system's ease of use is anchored to her or his general computer self-efficacy at all times, and objective usability has an impact on ease of use perceptions about a specific system only after direct experience with the system" (Venkatesh and Davis, 1996, page 451).

While almost all studies in the information systems literature report support for the TAM, a few studies did not find support for part of the model. In a study of broker workstations, Lucas and Spitler (1999) added system-based variables such as perceived system quality and norms to the TAM. They also identified two control variables, workload and prior performance. They found that the main variables of TAM were not significant determinants of adoption of Windows-based broker

workstations. Variables not in the original TAM such as social norms and prior performance influenced adoption and performance. Geffen and Struab (2000) examined the TAM literature and concluded that relationship between perceived ease of use and usefulness is tenuous at best. Some studies in the literature reported that perceived ease of use has a significant positive impact on perceived usefulness, whereas, others failed to identify the relationship.

TAM Research Around the World

In our research we examine the acceptance of information systems in an e-government setting in a developing country, India. While TAM has been extensively tested and validated within the US, its use in explaining adoption of information technology in other parts of the globe has been limited. Nevertheless, it is important for us to review existing studies that have utilized TAM in other parts of the globe to see whether it is still a valid model that explains user acceptance of technology.

Support for the TAM in studies across the world has been mixed. Results from studies on the adoption of Internet Banking (Chan et al. 2004) and group support systems (GSS) (DeVreede et al. 1998-1999) have found support for the TAM while a study of telemedicine use (Chau et al. 2001) found limited support for the model. Chan & Lu (2004) found that subjective norms and computer self-efficacy influence intention to adopt Internet banking technology. Perceived ease of use was not found to influence adoption directly; the effect was only indirectly through perceived usefulness. In a study of GSS use in Africa, De Vreede et al (1998-1999) concentrated on identifying and examining the role of external factors that affect perceived ease of use and perceived usefulness of technology. They identified five external factors. Out of these factors they found that three, endorsement of GSS technology by top management, computer literacy, and satisfaction with use would positively influence acceptance of GSS technology. The other two factors, preference for oral communication and referent power issues negatively affected GSS technology use.

There are studies that have questioned the validity of the TAM in a professional non-business setting. In a study of physicians practicing in public tertiary hospitals in Hong Kong, Chau and Hu (2001) found that there are limitations in using TAM in explaining or predicting acceptance of telemedicine technologies by individual professionals. They found that perceived ease of use does not affect perceived usefulness or attitude.

Organizational Culture and Information Systems

Culture refers to values and beliefs of individuals within a unit. It is also considered to be the totality of socially transmitted behavior patterns, arts, beliefs, institutions, and all other products of human work and thought characteristic of a community or population (Ein-Dor et al. 1993). There are a number of definitions of culture. Hofstede et al (1990) state, "There is no consensus about its definition, but most authors will probably agree on the following characteristics of the organizational/corporate culture construct: it is (1) holistic (2) historically determined, (3) related to anthropological concepts, (4) socially constructed, (5) soft, and (6) difficult to change."

Culture is based on the unit of analysis; the unit could be a nation, organization, profession, functional area or a team. Therefore, depending on the unit, culture can be categorized into different types: national culture, organizational culture, professional culture, functional culture and team culture. A number of studies in the information systems literature have examined the role of national culture. Culture plays a unique role in technologies such as the Internet and trans-national or global information systems, systems that provide information and services to individuals and organizations in different countries, with different cultures. Studies have explored the effect of cultural differences on the motivation of analysts and programmers (Couger 1986), design of information systems (Choe 2004; Ein-Dor et al. 1993) and technology acceptance (Straub et al. 1997).

Recent studies in the area have looked at culture at the organizational level, the focus of this research. Organizational culture refers to common values and beliefs shared by individuals within an organization (Punnett et al. 1990). Boynton and Zmud (1987) recommended that organizations should evaluate the importance of organizational culture and its impact on information technology planning. Researchers have investigated the role of organizational culture on absorptive capacity and information technology success (Harrington et al. 2005), information technology adoption and diffusion (Dasgupta et al. 1999), information technology implementation (Fedrick 2001; Harper et al. 2001), information technology infrastructure flexibility (Syler 2003) and user computer efficacy (Sheng et al. 2003). Other studies have looked at impact of organizational culture on specific technologies such as knowledge management (Gold et al. 2001) and implementation of data warehouses (Doherty et al. 2003).

It is important to note here that organizational culture has been operationalized in a number of different ways in the research literature. Most have operationalized culture as a second order construct. Etzioni (1975) explained organizational culture

using two dimensions: involvement and participation. Organizations can be classified into three types - coercive, utilitarian and normative organizations based on these two dimensions. Cameron and Quinn (1999) used the dimensions of flexibility/stability and internal/external focus to classify organizations into four types: clan which has flexibility and internal focus, adhocracy with flexibility and external focus, hierarchy with stability and internal focus, and market which is characterized by stability and external focus. Denison and Mishra (1995) identified four traits of organizational culture: involvement, consistency, adaptability, and mission. We use these four traits as second order constructs for organizational culture. Detailed descriptions of these constructs are provided in the research model section.

RESEARCH MODEL AND HYPOTHESES

The Technology Acceptance Model proposes that a number of factors influence an individual's acceptance of an information system. It states that external variables influence perceived ease of use and perceived usefulness of an information system. Perceived usefulness and ease of use, in turn, impact an individual's intention to use and actual use of the system. In this study we propose organizational culture is an important antecedent to the original TAM. Figure 1 below represents the research model for our study.
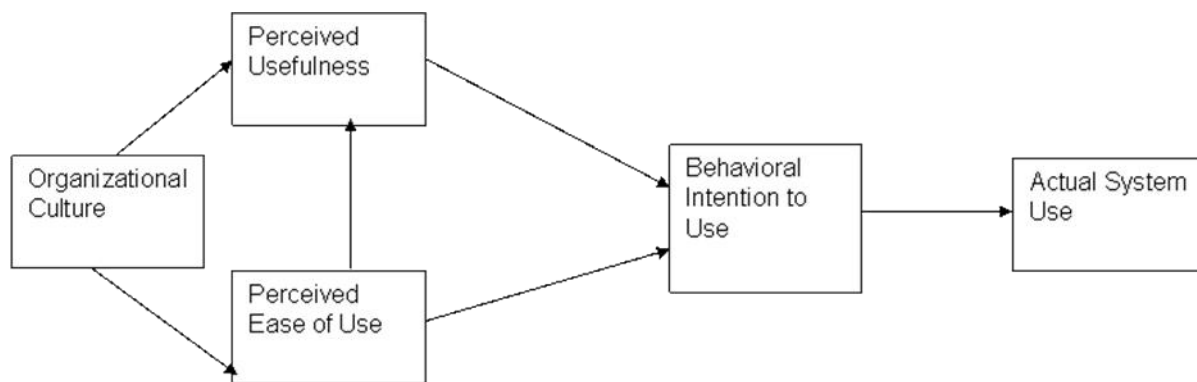

Figure 1: Organizational Culture and The Technology Acceptance Model

Denison and Mishra (1995) identified four traits of organizational culture: involvement, consistency, adaptability, and mission. Involvement refers to the extent of participation in the organization. More the involvement of an individual within an organization, greater is the sense of ownership and responsibility. Consistency provides an implicit control system based on internalized values within the organization. It represents the degree of normative integration. Adaptability is a reflection of the norms and beliefs in the organization and provides the capacity for internal change in response to external conditions. Mission trait provides purpose and meaning and long-term vision. We use these four traits, involvement, consistency, adaptability and mission as constructs for organizational culture. In this study we examined the use of Internet technologies in a government agency. We believe that these individual traits will impact an individual's perception of the ease of use and usefulness of the Internet. That is, we propose that culture is an antecedent to the traditional TAM. We use the terms Internet technology and system interchangeably in this paper. Therefore, we state our set of hypotheses regarding culture and hypotheses from the traditional TAM model, as follows:

H1a: Organizational culture will have a significant influence on perceived ease of use of the system.
H1b: Organizational culture will have a significant impact on the perceived usefulness of the system.
H2:   Perceived ease of use will have a significant effect on perceived usefulness of the system.
H3:   Perceived ease of use will have a significant effect on behavioral intention to use the system.
H4:   Perceived usefulness will have a significant effect on behavioral intention to use the system.
H5:   Behavioral intention to use will have a significant impact on actual use of the system.

As mentioned earlier, systems here refer to Internet-based technologies available to individuals in government. In this section we have described our proposed model and hypotheses. In the next section we present our research methodology including details of our sample, data collection and analysis.

METHODOLOGY

Sample

This study is aimed at understanding how employees in a government organization use Internet technologies, and how can the acceptance and use of these technologies be enhanced equitably across government organizations. For this study, authors designed the survey and then conducted a pilot study with 5 employees in a department at another government organization to test the design efficacy of the survey. Pilot study did not suggest any major changes to the survey research questions except for some minor changes to language in a few questions. After finalizing the research questions, a survey was conducted at the government organization in India by distributing paper-based surveys to employees over several days. Out of the 110 surveys that were distributed, a total of 102 completed surveys were returned with a return rate of almost 93%. One of the reasons for these high surveys return rate was that one of the authors was able to spend several weeks at the government agency.

Data Collection

A survey questionnaire was used to collect data regarding use of Internet technologies in an e-government setting. The questionnaire consisted of 57 items. In addition to demographic information this paper-based questionnaire collected data from individual users of Internet-based technologies on a number of constructs identified in the research model. These constructs included: organizational culture, perceived ease of use (PEOU), perceived usefulness (PU), behavioral intention to use, and actual use. Organizational culture was operationalized as a second order construct that consisted of four traits adaptability, mission, involvement and consistency (Denison et al. 1995). Earlier research had validated measures for each of the constructs and we decided to include those validated items in our questionnaire. We used this questionnaire to collect data from 102 individuals in a government agency.

Analysis

In our analysis of the data, we first created a correlation matrix. We then ran separate regressions for each of our hypotheses. Results of our analysis are presented in the results section.

RESULTS AND DISCUSSION

Results from the correlations matrix (see Table 1 below) shows that reliability measures for all of our variables were relatively high. An examination of the correlations showed that some were high. We found that correlations between perceived ease of use and perceived usefulness, and between the mission trait and consistency trait of organization culture were over the 0.70 threshold. The other cultural traits had correlations greater than 0.5.

	Mean	S.D.	Reliability	1	2	3	4	5	6	7
1. Involvement	4.69	1.46	0.73	1.000						
2. Consistency	4.89	1.55	0.71	0.607***	1.000					
3. Adaptability	4.50	1.42	0.75	0.548***	0.600***	1.000				
4. Mission	5.62	1.48	0.72	0.616***	0.718***	0.591***	1.000			
5. PEOU	5.62	1.14	0.73	0.271**	0.283**	0.197*	0.316**	1.000		
6. PU	5.24	1.18	0.75	0.231*	0.263**	0.023	0.318**	0.726***	1.000	
7.Intention to Use	5.10	1.62	0.78	0.237*	0.174	-0.041	0.106	0.322**	0.285**	1.000

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; PEOU = Perceived Ease of Use; PU = Perceived Usefulness

Table 1: Correlation Matrix

To avoid multicollinearity, we ran separate regression models for all of our dependent variables (see Table 2). For example, we ran separate linear regression models for intention to use with independent variables perceived ease of use and perceived usefulness. We did the same to analyze the effect of culture on perceived ease of use and usefulness.

Hypothesis	Dependent Variable	R^2	F-value	Independent Variable	Coefficient
H1a	PEOU	0.073	7.92**	Involvement	0.212**
		0.080	8.73**	Consistency	0.208**
		0.039	4.02*	Adaptability	0.159*
		0.099	11.10**	Mission	0.244**
H1b	PU	0.053	5.64*	Involvement	0.187*
		0.069	7.45**	Consistency	0.200**
		0.001	N.S.	Adaptability	N.S.
		0.101	11.28**	Mission	0.254**
H2	PU	0.527	111.20***	PEOU	0.749***
H4	Intention to Use	0.104	10.86**	PEOU	0.476**
H5	Intention to Use	0.082	8.34**	PU	0.409**
H6	Use	0.006	N.S.	Intention to Use	N.S.

*p-value < 0.05, **p < 0.01, ***p < 0.001; N.S. = Not significant

Table 2: Results of Regression Analysis

Table 2 provides results from regression analysis. We found support for all our hypotheses except for H6. In hypotheses H1a and H1b, we examined the relationship between culture and perceived ease of use and usefulness. We found that all the traits of culture: involvement, consistency, adaptability and mission, have a significant impact on perceived ease of use. This implies that organizational culture traits such as ownership and responsibility, internalized values, capacity to adjust and change, and greater sense of purpose have a positive influence on an individual's perceived ease of use of technology. All the organizational culture traits, with the exception of adaptability, were also found to impact perceived usefulness. Adaptability refers to the capacity for internal change in response to external conditions. Government agencies are known to have stable cultures that resist change; therefore, our findings seem to suggest that due to the lack of capacity for internal change employees in the government agency found the new technology less useful. In short, our results show that organizational culture influences information technology adoption. This also supports existing literature in the area of culture and information systems (Dasgupta et al. 1999; Doherty et al. 2003; Harper et al. 2001; Harrington et al. 2005).

We also found support for the traditional TAM. We found that perceived ease of use influences perceived usefulness. An individual's intention to use Internet technologies is affected by both perceived ease of use and perceived usefulness of the system. But, we did not find support for hypothesis H6. This is in line with recent TAM research where the intention to use construct was removed from the model. Therefore, we can say that perceived ease of use and perceived usefulness of Internet technology has a positive impact on the intention to use the technology. TAM, which has been widely tested in developed countries with a variety of technologies (Davis et al. 1989; Szajna 1996; Venkatesh 2000; Venkatesh et al. 2000; Venkatesh et al. 2002), can also explain information technology acceptance in a developing country.

CONCLUSION

Our results show that organizational culture has an impact on individual acceptance and use of Internet technologies in a government agency. This means that organizational culture should be carefully managed for the successful adoption and diffusion of Internet and other technologies. Moreover, greater emphasis should be placed on increasing the capacity for change if the organizational culture promotes stability. Change management techniques may be used to help organizations handle change better.

We believe that we have made a valuable contribution to the literature in the area of cultural research in information systems. We recommend additional research in governmental and non-governmental organizations in different countries.

ACKNOWLEDGEMENTS

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