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Scott McCoy
The College of William & Mary

Peter Polak
University of Miami

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Scott McCoy
The College of William & Mary
Scott.McCoy@business.wm.edu

Peter Polak
University of Miami
ppolak@miami.edu

Abstract

Much research in the past two decades has investigated the acceptance and use of information and communication technologies in the US and abroad. This study explores the TAM model in Mexico and attempts to look at factors other than the technology that could impede use, including national culture, infrastructure, and access costs.

Keywords: Technology acceptance model, cross-cultural IS research, Latin America, Mexico, IT diffusion, IT use

Introduction

There have been numerous studies using the technology acceptance model (TAM) (Davis 1989); however, only a small number apply the model outside of North America. Extending the work of McCoy and Everard (2000) who investigated the effects of culture on technology acceptance in Latin America, this research attempts to expand the factors that affect ICT adoption in one Latin American country. Looking beyond the system factors (TAM), we include National Culture, Telecommunication Infrastructure, and Access Costs to investigate the use of information and communication technologies (ICTs) in Mexico.

Prior Research

Technology Acceptance Model

Davis (1989) developed the TAM model to predict acceptance of technology by users. In his work, Davis posits that users develop perceptions about the usefulness and ease-of-use of technologies. These perceptions influence intention to use a particular technology.

National Culture

Culture is a complex notion that is best assessed in terms of multiple dimensions (Table 1). Hofstede (1984) defines culture as, "collective programming of the mind" (p. 13). His four dimensions have been used to distinguish national cultures in terms of broad value differences.

Table 1. Hofstede's Dimensions and the Scores for Mexico

Hofstede's Dimension	Definition	Score
Uncertainty Avoidance (UA)	Degree to which people in a country prefer structured over unstructured situations.	82
Power Distance (PD)	Degree of inequality which exists in a country.	81
Masculinity/Femininity (MF)	Degree to which "masculine" values like assertiveness, performance, and success prevail over "feminine" values like the quality of life, maintaining warm personal relationships, service, and solidarity.	69
Individualism/Collectivism (IC)	Degree to which people in a country act as individuals rather than as members of cohesive groups.	30

(Source: Adapted from Hofstede 2001)

Uncertainty Avoidance

The uncertainty avoidance dimension determines the degree to which individuals feel threatened by and try to avoid ambiguous situations by establishing more formal rules and rejecting deviant ideas and behaviors. Differences in uncertainty avoidance can affect how individuals choose media for their communication tasks. Individuals scoring high on UA are more likely to consider computer-based media less useful and harder to use than those scoring low on UA.

Power Distance

The power distance dimension refers to the extent to which inequality is seen as an existing reality. PD may affect the use of ICTs; in cultures exhibiting high power distance, the inherent equalizing nature of computer-based media may appear to be a direct challenge to authority and thus undesirable.

Masculinity/Femininity

A culture high on masculinity is associated with an emphasis on work goals, such as earnings and promotion, and assertiveness. Hence, one would expect that in highly masculine cultures, ICTs would be used if they assist in meeting the goals of their users.

Individualism/Collectivism

The individualism/collectivism dimension refers to the extent that individuals' self-interests are prioritized over the concerns of the group. Those scoring low on IC (collective people) would be more inclined to use face-to-face communication over computer-based media because of the ability to more readily transmit social situation cues which are deemed important.

The analysis of ICT usage in any particular country as influenced by the perceived easy of use, perceived usefulness, and cultural variables would benefit by taking into consideration the different conditions in which the ICT users find themselves.

Telecommunications Infrastructure

One of the essential conditions for ICT adoption is to have the necessary infrastructure in place (Adam 1996; Mbarika 2001). An existing infrastructure can be viewed as a facilitator in the relationship between intentions to use ICTs and actual use.

A widely accepted measure of infrastructure quality in the telecommunications sector is teledensity, which is the number of fixed telephone lines per hundred inhabitants. Due to socioeconomic and political problems faced by many Latin American countries, the region has been reported to have lower levels of most ICT-related infrastructures compared to the US and Europe. The current reports of teledensity for Mexico indicate a steady increase from 11.9 (CIA factbook) in 2000 to about 13.7 in 2002 (Hinojosa 2002). This compares to 69 in the US (CIA Factbook).

When focusing on ICTs, it is important to not only investigate teledensity, but also the computer users' ability to use Internet-enabled computers. Among others, one readily available measure is the number of Internet hosts per 1,000 inhabitants. The current estimate of the number of Internet hosts is 38 per 1,000 inhabitants in Mexico, compared to 234 for the US (National Science Foundation 2002).

Access Costs

While the availability of the Internet-enabled computers to the general population can be viewed as a facilitator in the ICT usage analysis, the general cost levels that potential users have to pay for access to the network can be considered as inhibitors in the intentions to usage relationship.

In the United States the average cost of a dial-up internet access has been steadily declining and has now reached the point of approximately $15 per month. Adjusted for the gross national product per capita, this represents about .65% of the expenditures on Internet access, which places the United States at the 6th position in the ranking of 72 countries (Center for International Development at Harvard University 2001). On the other hand, developing countries experience higher costs of services, and at the same time lower levels of GNP per capita. Combined, the relative amount that is expended on Internet access is much higher. The estimates for Mexico indicate that 5.17% of the GNP per capita is spent on Internet access, placing the country at the 41st position. The differences in accessibility to the Internet are even greater when broadband solutions are examined, for example, ADSL or cable modem. In many developing countries these options are not readily available, and in the few locations where they are offered, the prices are significantly higher than in the developed countries where competition is creating price-reducing pressures almost on a daily basis.

Proposed Study and Model

As outlined in the research model (Figure 1), this study attempts to investigate the use of TAM in Mexico and seeks other factors that may affect intention to use and actual usage. These factors include National Culture, ICT Infrastructure, and Access Cost.
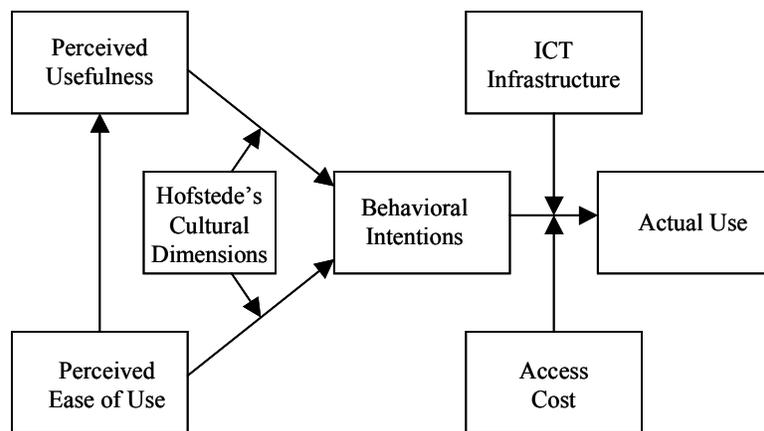

Figure 1. Proposed Research Model

This study proposes that the TAM model (Davis 1989) will hold when tested in Mexico with ICTs. In this research, perceived usefulness (PU) refers to the prospective user's subjective probability that using ICTs will increase performance, and perceived ease of use (PEU) refers to the degree to which the prospective user feels that ICTs will be free from effort. Both of these constructs directly affect behavioral intentions. In addition, PEU directly affects perceived usefulness. Based on previous research, we expect:

> *H1: The Technology Acceptance Model will hold in the Mexico sample.*

In addition to the TAM constructs, this research also looks at National Culture, the ICT infrastructure and the costs of ICT equipment and Internet access. National culture is expected to moderate the relationship between PU and BI, and PEU and BI. We expect:

>*H2a:* *Hofstede's cultural dimensions will moderate the relationship between Perceived Usefulness and Behavioral Intentions, such that the Mexico sample will have lower intentions to use Information and Communication Technologies.*

>*H2b:* *Hofstede's cultural dimensions will moderate the relationship between Perceived Ease of Use and Behavioral Intentions, such that the Mexico sample will have lower intentions to use Information and Communication Technologies.*

ICT infrastructure and access costs are expected to moderate the relationship between BI and actual usage. Behavioral intentions measure the strength of person's intentions to perform the behavior, and are a major determinant of actual use (Davis 1989). In addition, Hill et al. (1987) showed that behavioral intentions significantly predict actual behavior. However, we propose that factors, such as ICT infrastructure and access costs could prevent useful and easy to use technologies from being used. Therefore, we hypothesize:

>*H3: Information and Communication Technology infrastructure will positively moderate the relationship between behavioral intentions and actual use.*

>*H4: The access costs will negatively moderate the relationship between behavioral intentions and actual use.*

Research Method, Proposed Analysis and Expected Results

This study will utilize a survey instrument to collect data on the TAM constructs in the model. In order to test how well the TAM model explains variance in intention to use ICTs within the Mexico sample, regression analysis will be used. Behavioral intentions to use email will be used as the dependent variable and perceived ease of use and perceived usefulness will the independent variables. In addition, Hofstede's measures of national culture will be used to investigate the moderating effects on BI. Secondary data will be used to determine the costs of Internet access and the relative ICT infrastructure. These two independent variables, ICT Infrastructure and Access Costs will also be used in a linear regression model to test their relationship with intentions to use ICT. All hypotheses are expected to be significant.

Conclusions and Current Status

This research-in-progress research attempts to develop a more comprehensive model of ICT use in Mexico by combining the TAM model with National Culture, ICT infrastructure, and Access Costs. It is expected that culture will moderate the relationship between PU and BI, and PEU and BI. In addition, ICT infrastructure and access costs will moderate the relationship between BI and actual use.

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