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Evaluating Electronic Commerce Acceptance with the Technology Acceptance Model

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ABSTRACT

This study applies the Technology Acceptance Model (TAM) to electronic commerce participation using a sample of 138 college students. Ease of use was found to have an impact on whether someone would buy a product online and on usefulness. Usefulness had an impact on the number of times a respondent purchased items online. The number of hours spent using the Internet per week had a significant impact on all four measures of electronic commerce participation, whether they bought something online, how many times they bought something online, how frequently and how much was spent buying online. Surprisingly, security and privacy concerns did not have an impact on electronic commerce participation.

INTRODUCTION

The consensus for online sales during the 2000 holiday season was somewhere between $9 and $11 billion dollars (Verton and Copeland, 2001), considerably less than the $17 billion online retail revenues that were predicted to be reached by 2001 (Maddox, 1998). A slowing economy could also have had an impact on the less than expected sales, but many are beginning to doubt the predicted rosy future of online sales will be reached. Outrageous estimates of $3.2 trillion in worldwide sales over the internet by 2003 (Patel, Schenecker, Desai and Levitt, 1998) and that by 2005 one-third of all food retailing will be done electronically (Chandler, 1995) are beginning to sound like unlikely predictions. Were the initial estimates of electronic commerce growth wildly optimistic or are there factors that have slowed down adoption? As many retailers struggle with their on-line operations and dot coms close their virtual doors there is an important and fundamental question to address. Why do consumers participate in electronic commerce?

MODEL

The acceptance of new technologies has long been an area of inquiry in the MIS literature. The model most widely used is the Technology Acceptance Model (TAM), developed by Davis (1989). TAM states that perceived usefulness and perceived ease of use impact attitude towards use, which impacts behavioral intentions, which in turn impacts actual usage. Additionally, perceived ease of use impacts usefulness to the extent that a system or application must be easy to use for people to use it and thus realize it's usefulness. This model was chosen to address electronic commerce acceptance because of its strong theoretical base and the many studies that have supported it. A few modifications were made to make it more relevant to the application being addressed, online shopping.

Using TAM to study the acceptance of e-commerce necessitated making two changes to the model. First, the issue of usage needs to be defined. The motivation and barriers for participation would conceivably differ for buying and browsing online, this model will only address purchases of products online. Additionally, there are a number of ways that the usage of online shopping can be addressed. This research will address usage from four perspectives, whether it has been used, how many times, how frequently and the amount of money spent online.

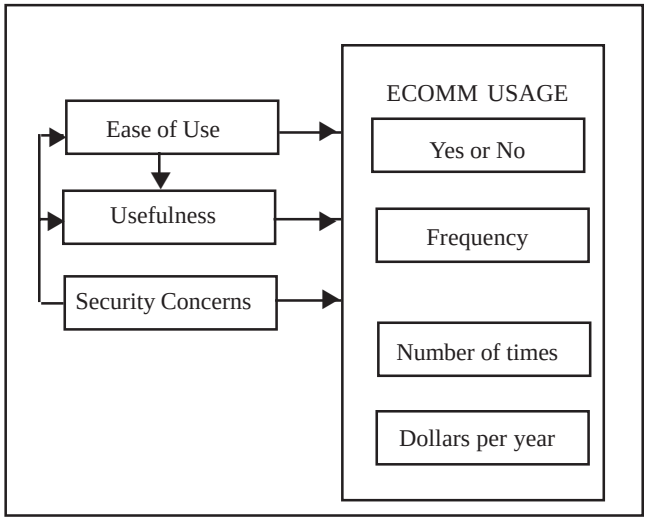
The second addition to the model involved adding determinants specific to the acceptance of electronic commerce. Credit card security and the disclosure of personal information are of great concern to consumers and are believed to be frequent barriers to e-commerce usage (Bellman, Lohse and Johnson, 1999; Hoffman and Novak, 1999). A preliminary study found that web users did not feel the use of a credit card online was secure (McCloskey and Whitely, 2001). These issues were included in the model to obtain a more complete understanding of the factors contributing to e-commerce acceptance. The model proposes that security and privacy concerns have both direct and indirect effects on usage. The proposed model is depicted in Figure 1.

METHODOLOGY

Sample

Students from several undergraduate business classes were asked to participate in this study. Questionnaires were distributed and collected in class. Complete and usable questionnaires were received from 138 participants.

Figure 1



Measures

Concerns about security and privacy have been identified as barriers to electronic commerce participation (Hoffman and Novak, 1999). Two items were designed to assess the extent to which the respondent is concerned about providing personal and financial information online.

The developed perceived ease of use items focus on the ease of the entire transactions, including placing an order, making payment and rectifying any problems. Four items were designed to address the ease of use of buying online.

Five items were developed to assess the usefulness of purchasing products over the internet. The items focus on convenience, efficiency and saving time.

Respondents were asked to indicate the number of times they purchased products online in the last year. Frequency of use was also assessed with a six-point scale ranging from (1) not at all to (6) daily. Additionally, those respondents who have made online purchases were asked to estimate the total dollar amount of their purchases for the last year.

Data Analysis

Complete and usable questionnaires were collected from 138 respondents. A demographic summary is provided in Table 1. Eight one respondents (59%) indicated they had made one or more online purchases in this time period. These individuals were categorized as electronic commerce participants. The fifty-seven respondents (41%) who indicated they had not made an online purchase in the last year were categorized as non-participants. Analysis reveals that there is not a significant difference in the distribution of gender or the age of e-commerce participants and non-participants. There are, however, significant differences in the amount of time e-commerce participants and non-participants spend using the internet and email. It will be important to control for these differences when evaluating the proposed model.

Among those who have made a purchase online, the average number of purchases in the past year is 7 (std dev 9) and the average dollar amount of the total purchases made online in the past year is $389 (std dev $543). Frequencies are reported in Table 2.

Since the sample size was only 138, multiple regression was used to see if there is support for the proposed model. It was necessary to include, and therefore control, demographic variables that may cause spurious effects. The choice of control variables was governed by theory and prior empirical studies as well as dictated by the current data. The number of hours spent using the internet and email were significantly correlated with the study variables and have been suggested as determinants of online shopping (Bellman, Lohse and Johnson, 1999). It was therefore necessary to control these characteristics. The number of hours spent per week using the internet and email were included as having a direct effect on the use of electronic commerce and an indirect effect via the three independent variables, ease of use, perceived usefulness and security and privacy concerns.

Table 1: Demographics on Total Sample and Sub-Groups

	Total Sample (N=138)	Electronic Commerce Participants (N=81)	Electronic Commerce Non-participants (N=57)	
Gender	74 (54%) male 64 (46%) female	41 (51%) male 40 (49%) female	33 (58%) male 24 (42%) female	
Age	20.8 (1.6 std dev)	20.9 (1.8 std dev)	20.6 (1.2 std dev)	
Hours spent using the internet (excluding email) per week	10.7 hours (13.8 std dev)	13.9 hours (16.4 std dev)	6 hours (6.3 std dev)	***
Hours spent using email per week	4.3 hours (5.3 std dev)	5.1 hours (6.3 std dev)	3.2 hours (3.1 std dev)	*

Table 2: Frequency of Purchasing Products Online

How many times have you purchased something over the internet in the last year?	Number	Percentage
0	57	41%
1-5	56	41%
6-10	14	10%
11-15	3	2%
16-20	2	1%
21-25	3	2%
25+	5	4%

Table 3: Factor Analysis of Multi Item Constructs

	Factor 1 Usefulness (alpha = .892)	Factor 2 Ease of Use (alpha = .741)	Factor 3 Security/ Privacy (alpha = .693)
Buying products over the internet is easier then purchasing them from a store	.739		
Internet shopping saves me time	.812		
Buying things over the internet is more convenient	.848		
Internet shopping is useful because products can be easily found and purchased	.733		
Internet shopping makes my life easier	.847		
It is easy to purchase items over the internet.		.740	
Payment or delivery problems can easily be rectified with an online vendor		.769	
Placing and order online is easy to do		.717	
Question and problems can easily be addressed when making purchases over the internet		.571	
I worry about providing personal information when purchasing items over the internet			.816
I worry about providing financial information when purchasing items over the internet			.818

RESULTS

The results of the regressions are presented in Table 4. Only a few of the proposed relationships were supported. The significant relationships are shown in Figure 2.

DISCUSSION AND IMPLICATIONS

It seems that both ease of use and usefulness are components of some aspects of electronic commerce acceptance. Participation is based on ease of use and continued usage is based on usefulness. Ease of use also has a direct impact on how useful online shopping is perceived to be. This study found that usefulness, the extent to which buying products online is convenient and efficient, has an impact on the number of times an individual purchases items online. The usefulness of electronic commerce transactions is significant in determining the number of transactions a person completes. The more strongly an individual feels about the convenience and ease and time saved shopping on the web, the more purchases they are likely to make in this way. Again, e-commerce web

design is critical. Consumers should be able to quickly locate items and complete the transaction.

Despite the number of times that security and privacy concerns have been given for the slow adoption of electronic commerce, these factors do not appear to have a significant impact on electronic commerce participation. Perhaps the increased attention electronic commerce vendors are placing on explaining their security and privacy policies and procedures are having an impact. Or perhaps this finding is a result of using college students as the sample. This sample may be more technology savvy than the general population and thus more knowledgeable about how to protect themselves online. Conversely, due to their age this sample may not realize how important it is to protect your credit rating and therefore, are not as concerned about security and privacy.

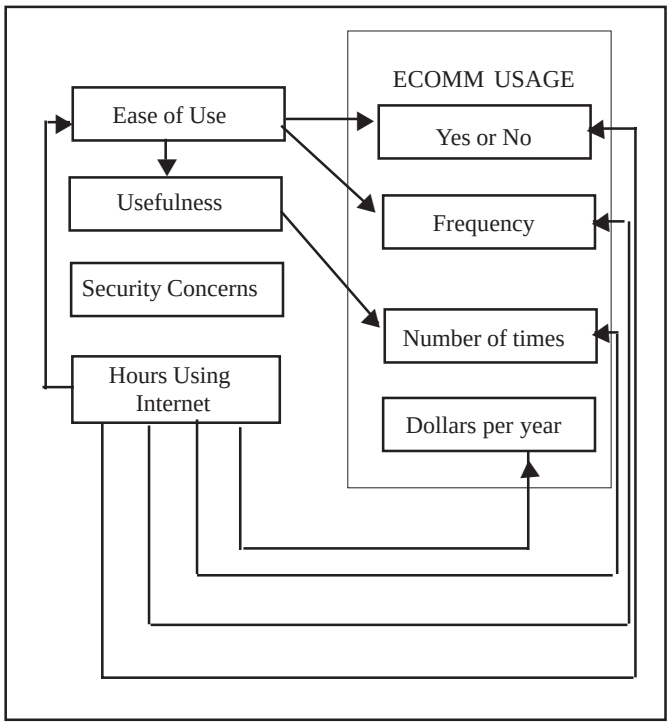
Although other research has found that the number of daily emails is a predictive factor in determining buying goes online (Bellman, Lohse and Johnson, 1999) this research found that email usage did not have an impact on any of the study variables. The amount of time spent using the internet did have an impact on each of the four measures of electronic commerce participation. Individuals who used the internet more often were more likely to make a purchase online, make more purchases more frequently and spend more money. Additionally, individuals who use the internet more frequently perceive electronic commerce to be easy to use but did not have a significant impact on usefulness.

The future of many online retailers is in question. Perhaps the biggest determinant of the future success of electronic commerce is whether the current market base will expand. The vast majority of American consumers have thus far not bought anything online. Understanding the barriers that individuals have to online purchases may be crucial to its survival.

Table 4: Hierarchical Regression Results

EASE OF USE				.094
Hours spent using email	-.070	-.738 (.462)		
Hours spent using internet	**-.237**	**-2.500 (.014)**	*****	
Security/privacy concerns	.1241.484 (.140)			
USEFULNESS				.385
Hours spent using email	-.126	-1.602 (.112)		
Hours spent using internet	-.024	-.303 (.762)		
Security/privacy concerns	.043	.618 (.538)		
Ease of Use	**.569**	**7.872 (.000)**	*******	
BUY (Y or N)			.	180
Hours spent using email	.013	.143 (.886)		
Hours spent using internet	**.182**	**1.952(.053)**	*****	
Ease of Use	**-.201**	**1.974 (.051)**	*****	
Usefulness	-.124	-1.224 (.223)		
Security/privacy concerns	-.118	-1.466 (.145)		
BUY (Number of time)				.154
Hours spent using email	-.052	-.555 (.580)		
Hours spent using internet	**.238**	**2.512 (.013)**	*****	
Ease of Use	-.055	-.534 (.595)		
Usefulness	**-.237**	**-2.293 (.023)**	*****	
Security/privacy concerns	-.034	-.414 (.679)		
BUY (Frequency)				.207
Hours spent using email	.095	1.039 (.301)		
Hours spent using internet	**.187**	**2.039 (.044)**	*****	
Ease of Use	-.171-1.714 (.089)			
Usefulness	-.148-1.490 (.139)			
Security/privacy concerns	-.117	-1.476 (.142)		
BUY (Dollar amount)				.108
Hours spent using email	-.135	-1.363 (.176)		
Hours spent using internet	**.217**	**2.174 (.032)**	*****	
Ease of Use	-.074	-.676 (.500)		
Usefulness	-.145	-1.331 (.186)		
Security/privacy concern	**-.110**	**-1.271 (.206)**		

Figure 2



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