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ON-LINE PURCHASING INTENT: THE EFFECT OF PERSONAL INNOVATIVENESS, PERCEIVED RISK, AND COMPUTER SELF-EFFICACY

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Abstract

With the increasing importance of B2C commerce in today's business environment it is important to study the factors that impact a consumer's intention to purchase on-line rather than through another channel. This study looks at Personal Innovativeness, Computer Self-Efficacy, and Perceived Risk as antecedents to the decision to purchase on-line. All of these factors were found to be significantly related to the decision to purchase.

Introduction

Business research firm eMarketer is predicting the total business-to-consumer (B2C) commerce market will reach \$90.1 billion in 2003, and by 2005 they predict the B2C e-commerce will reach \$133 billion. Similarly, Jupiter Research suggests that the market will reach \$85.7 billion and climb to \$132.2 billion by 2005 (Narine, 2003).

Excluding travel, eMarketer is projecting \$58.2 billion in B2C retail revenue in 2003, while Jupiter Research statistics show non-travel e-commerce revenue will be in the range of \$51.7 billion. Both firms indicate that more than half of the Web population has embraced online shopping (Narine, 2003). With these dramatic increases in the number of consumers actually shopping online, Web vendors need to better understand *who* is buying, *what* they are buying, and what *factors* influence their purchase decision (Korgaonkar & Wolin, 1999; Donthu & Garcia, 1999).

Unlike traditional brick-and-mortar businesses, online businesses do not have the ability to interact face to face with their customers. This lack of rich social queues and face-to-face feedback mechanisms means that online vendors must closely examine consumer attributes and structure their web pages to directly address consumer preferences by designing flexible, customizable web sites with broad appeal.

Practitioners and researchers are trying to better understand why consumers have been reluctant to purchase online. Initial e-commerce beliefs were that purchasing through the Internet would provide consumers with greater convenience, lower prices, and a wider variety of sellers from which to choose. However, many consumers still prefer to shop for certain items in a face-to-face environment due to uncertainty about customer service, privacy concerns, the possibility of additional billing charges, credit card security, confusing Web sites, not being able to physically feel the merchandise, and a general lack of trust in the Web vendor (eMarketer, 2001). Using Klein and Sorra's (1996) concept of "fit/compatibility" of a particular innovation to its context, we look the effect of the consumer beliefs about his/her computer self-efficacy, personal innovativeness, and perceived risk as they affect his/her level of purchase intent of a digital camera.

Theoretical Framework

One of the models frequently used to explain the intention to use a technology by individuals in an organizational setting is the Technology Acceptance Model (TAM). In this model Intention to Use an innovation is influenced by the Ease of Use of the technology and the Perceived Usefulness of the technology in the work setting to accomplish work-related tasks (Rai, Lang & Welker, 2002). However, recently, this model has also been applied outside an organizational setting to help explain the acceptance of on-line commerce by individuals (van der Heijden, Verhagen & Creemers, 2003; Koufaris, 2002; Childers, Carr, Peck & Carson, 2001; Devaraj, Fan & Kohli, 2002; Yoon, 2002). One of these studies found no significant link between perceived usefulness and purchase intentions (van der Heijden, et al., 2003). This lack of finding may be the result of the fact that the original usefulness measure was designed relative to job related tasks. In an on-line commerce setting this may not be appropriate. The determinants of perceive usefulness for on-line commerce may well vary considerably among individuals in different contextual environments.

Similarly, Chau and Hu (2001) suggest that a professional setting where the professional has a greater degree of discretion in adoption may not be comparable to the organizational setting proposed in the original model. We believe a similar discretionary environment exists in e-commerce. In their study they state that compatibility is “largely congruent with perceived usefulness in the context of TAM” (p. 703).

Thus, innovation compatibility may help explain some contextual variables which would effect perceived usefulness in an e-commerce setting. Klein and Sorra (1996) suggest that at the organizational level the effectiveness of a technology’s use is a compatibility related combination of the organization’s climate for the innovation and a fit of the innovation to the targeted users’ values. The innovation-values fit construct describes the extent to which users perceive that the use of the innovation will aid in the fulfillment of their values by assessing “the objective characteristics of an innovation and its socially constructed meaning.” (p. 1063). Therefore, we believe that the concept of values-fit compatibility rather than usefulness in job tasks is an appropriate operationalization of compatibility/usefulness construct in the on-line e-commerce context.

Model Development

Based on the previous discussion we propose the following theoretical Online Purchasing Model (see Figure 1). The model consists of three compatibility/usefulness variables. The first values-fit compatibility variable is Computer Self-efficacy’s (CSE). The second values-fit compatibility variable we study is Personal Innovativeness (PI). The third value-fit compatibility variable studied is Perceived Risk (PR).

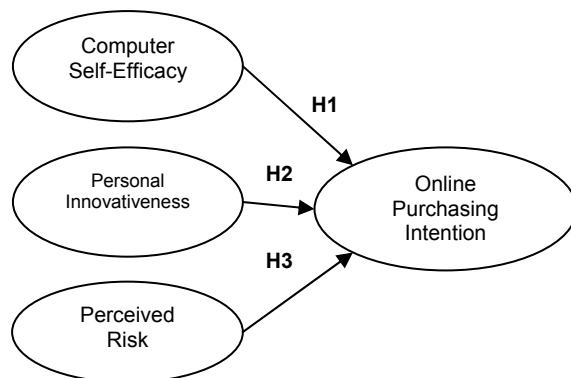


Figure 1. Online Purchasing Model

Computer Self-Efficacy, or “the belief that one has the capability to perform a particular behavior” (Compeau & Higgins, 1995), such as the use of the Web to conduct commerce on-line, is an important first step to engaging in e-commerce. Compeau & Higgins (1995), found that computer self efficacy, or an individual’s belief about their ability to competently use computers, had a significant influence on their actual computer usage. Computer self-efficacy has been widely studied across numerous referent disciplines and has been shown to be important in an individual’s attitude toward the use of a computer to complete a task (Bandura et al. 1977; Barling and

Beattie, 1983; Webster & Martocchio, 1992). Similarly, while in the TAM model the measures of Ease of Use and Usefulness appear invariant across many situations, one in which it is not invariant is related to self-reported computer experience, suggesting that this is an important distinction (Doll, Henrickson & Deng, 1998).

CSE has been studied by Chau (2001) in relation to IT Usage Behavior and this study resulted in a finding of a small negative effect on perceived usefulness. Similarly, self-efficacy was found to have a significant indirect influence on behavioral intentions towards usage by Taylor & Todd (1995). In this case, since computers have been in use for some time, we adapted the construct to also reflect Web self-efficacy rather than merely computer self-efficacy. Therefore we propose:

H1: *Computer/Web Self-Efficacy will positively influence perceived intention to use.*

The second component of values-fit compatibility and its impact on Online Purchasing Intentions is a person's beliefs and attitudes toward innovation and the Internet. The Internet is a relatively new shopping environment and people have little actual purchasing experience in this type of distributed environment (Shim, Eastlick, Lotz, and Warrington, 2001). Due to the newness of the online atmosphere we expect to see innovators as the first individuals actually purchasing online. The belief that the Internet is a new way to purchase goods and that it might offer advantages such as lower prices, convenience, and wider selection would tend to attract innovators despite higher levels of uncertainty and risk. An individual's level of innovative behavior has been shown to be a key element in his/her acceptance of new technologies (Brancheau & Wetherbe, 1990). A similar construct, enjoyment, has been used in several studies of on-line shopping (Childers, et al, 2001; van der Heijden, et al, 2003; Koufaris, 2002).

Childers et al, state that enjoyment refers to the "extent to which the activity of using the technology is perceived to provide reinforcement in its own right..." (p. 513). "Although, providing strong evidence for the effect of the physical environment on shopping behavior, in contrast very little is known about how the design characteristics of interactive shopping sites affect online purchase behavior and other usage indicators, such as, site usefulness and ease of use." (Childers et. al., p. 529). In other words, we need to determine how to provide enjoyment on-line.

An innovative person would enjoy the challenge of this new frontier. Similarly, Yoon (2002) used receptivity to innovation as a personal variable in this study of online-purchase decisions, however, it represented just one dimension of the personal variables scale. Therefore we propose:

H2: *Personal Innovativeness will be a positively influence On-line Purchase Intent.*

Some consumers see purchasing on-line as high risk due to the possibility of information theft, extraneous credit card charges, a lack of physical store presence, and the difficulty in addressing customer service issues (Shim, Eastlick, Lotz, and Warrington, 2001). Researchers have shown that risk is a key concern for consumers who purchase innovative products (Holak & Lehmann, 1990). This perceived risk may be lessened either by trusting the on-line company or by the existence of control mechanisms designed to protect the consumer (van der Heijden et al, 2003). Findings suggest perceived risk is negatively related to attitude towards on-line purchasing at a significant level (van der Heijden et al, 2003).

The use of a capabilities values-fit perspective for determining the antecedents of useful in an e-commerce setting allowed us to introduce these transaction cost considerations. Ring (1996) suggests that the existence of trust between parties in a transaction reduces the transaction cost involved in protecting oneself during the transaction. Devaraj et al (2002) tested TAM and transaction costs models as competing models to explain channel satisfaction and preference in B2C. Therefore we propose:

H3: *Perceived Web Risk will negatively influence On-line Purchase Intentions.*

Methodology

Participants were undergraduate and graduate students majoring in Marketing, Information Systems, or other non-business majors at a large Southeastern U.S. university. Year in school ranged from entering freshman to graduate students. Age ranged from 18 to 40 with a mean of 23.1 years. The sample included 48.2% majors in Information Systems (IS), 10.9% in Marketing, and 40.9% were from varied majors. With respect to gender, the sample included 63.6% males and 35.5% females. Participants had taken an average of 3.8 computer courses. Of the participants 32.7% had purchased electronics online before, 89.1% own a computer, made an average of .63 purchases per month over the Internet, and 18.2% currently own a digital camera.

	Mean	Range	Standard Deviation	Skewness	Kurtosis
Gender	1.642	1 to 2	0.482	-0.602	-1.669
Age	23.122	18 to 40	3.980	1.775	3.591
Year in School	2.422	1 to 5	1.712	0.648	-1.376
Computer Courses	3.794	0 to 15	3.456	1.181	0.925
Monthly Internet Purchases	0.634	0 to 7	0.998	3.470	17.594
Electronics Purchased	1.566	1 or 2	0.586	-0.986	0.001
Own Computer	1.109	1 or 2	0.313	2.543	4.547
Own Digital Camera	1.764	1 or 2	0.487	-1.959	3.135

Subjects were not offered any incentive to complete the questionnaire and were informed that participation was completely voluntary and anonymous. Information Systems and Marketing students completed the questionnaires in class and non-business majors completed them outside class. A total of 110 useable responses were collected while 4 participants chose not to participate.

Participants were given a short description of the study and asked to take as much time as they needed to complete the questionnaire. After selecting a digital camera, the questionnaire was collected and participants were asked to fill out the second part of the questionnaire that dealt with questions regarding the process he/she used to arrive at his/her decision. Questionnaire parts one and two were matched up using a numerical coding technique.

Measures were drawn from the Marketing, Consumer Behavior, and Management Information Systems literatures.

Purchasing Intention. Purchasing intention was measured using two items asking whether or not they would actually purchase a digital camera on the Internet. Measurement of this intention is consistent with Marketing and Consumer behavior research.

Personal Innovativeness. Personal innovativeness was measured using four items aimed at measuring a person's tendency to experiment with new technologies. These items have been widely used and have been validated through several studies (Agarwal, 2000; Agarwal and Prasad, 1998). These measures have focused on dimensions such as experimentation, willingness to try new technologies, and early mover tendencies.

Computer Self-efficacy. Computer self-efficacy was measured using five items targeted to measure a person's belief that they are able to use a computer to achieve their goals. These measures have been widely used in Information Systems research and have been shown to accurately represent a persons underlying belief about their ability to perform tasks with a computer (Martocchio and Webster, 1992; Webster and Martocchio, 1992; Webster and Martocchio, 1995). These measures deal with dimensions such as proficiency, confidence, and use of computer skills.

Perceived Internet Risk. Internet risk was measured using six items validated by McKnight, Choudhury, and Kacmar (2002). These items have shown to accurately predict an individual's perceptions of risk, hesitation, and lack of safety when dealing in an online environment.

Data Analysis

Preliminary analysis was run on the collected data through the use of histograms and scatter-plots. These results indicate that items are normally distributed with no significant outlying values.

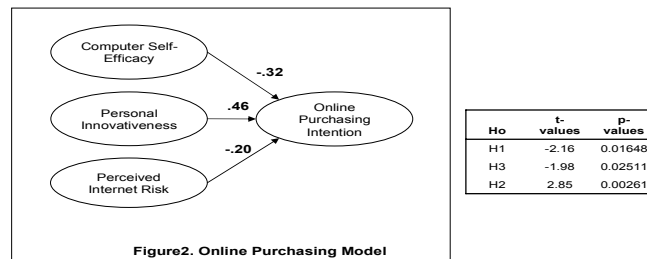
Lisrel analysis was conducted to determine the statistical significance of the relationships between the theoretical constructs (Mueller, 1996). Hair, Anderson, Tatham, and Black (1998) note that a minimum of "5 times as many observations as there are variables to be analyzed, and the more acceptable size would have a ten-to-one ratio." With fifteen variables (four factors) being measured, the minimum would be 75 and the optimal would be 150 or higher, however there is a caveat that samples should not be run with less than 50 observations and samples over 100 are the preferred size (Mueller, 1996). Thus, the sample size of $n = 110$ for this exploratory study falls midway between the minimum and optimal sample size requirements.

As previously noted, items used were based on previously validated measures. The default optimization method maximum likelihood was used to maximize the probability of the data given the model. Fifteen observed variables were used to estimate 4 underlying latent variables. Factor analysis was performed to test whether the measures loaded as separate components and 4 factors appeared as expected. The Personal Innovativeness measures loaded at 0.72 or above. The Computer Self-efficacy questions all loaded at 0.88 or above. Similarly, the Risk measures all loaded at 0.78 or above and the Purchase Intent measures all loaded at 0.91 or above. Thus, all measures load in a

Varimax rotation factor analysis at acceptable levels. Reliabilities, as measured by Cronbach's alpha, are CSE = .94, RISK = 0.92, PCHINT = 0.87, and PIIN = 0.81.

Thus, the constructs showed both convergent and discriminant validity (Mueller, 1996; Hair, Anderson, Tatham, and Black, 1998). Items should load higher on their associated latent construct than other constructs. There were no indications of excessive inter-item correlation or multicollinearity.

Structural Model



Results from the Lisrel analysis are shown above in Figure 2. Correlations (r) and the significance values are shown for each relationship in the proposed model. The results show that the correlation ($-.032$) between CSE and Usage was significant ($p < .02$) therefore we find support for H1. H2 was also supported as the relationship between Personal Innovativeness and on-line purchase intent was significant ($p < .01$). The relationship between perceived risk (PR) and online purchasing intent was $r = -.20$ and significant at $p < .03$, therefore we find support for H3.

The fit of the overall structural model was quite good. The fit of the model to the data produced fit indices showing: Chi-square value of $\chi^2 = 103.42$ ($P = 0.074$), Comparative Fit Index (CFI) = 0.98, Normed Fit Index (NFI) = 0.92, and Goodness of Fit Index (GFI) = 0.88.

Limitations

While we would like the sample size to be larger (>150), it is acceptable according to Mueller (1996). The study uses students as subjects and non-students should be tested to determine generalizability.

Implications for Research and Practice

A goal of this study was to explore innovation factors related to on-line purchasing intent. This information is important to those organizations hoping to successfully compete in an on-line environment. It is also important to innovation researchers who are hoping to build a comprehensive model to explain the adoption of B2C ecommerce.

The TAM model that is frequently used to explain individual adoption within an organizational setting has been questioned as to its applicability to other situations such as professional environments and environments in which organizational climate and absorptive capacity are not relevant, and the individuals have a greater amount of discretion. Business-to-consumer e-commerce is a situation in which individuals are more difficult to influence than they are in an organizational setting.

This research has begun to collect some of the important factors suggested by other on-line purchase intention studies and combine them together into one model. This study has three significant findings for the proposed relationships.

As expected perceived risk has a negative influence on on-line purchase intent. As proposed by Ring and Van de Ven (1992), Ring (1996) and van der Heijden et al (2003), risk can be mitigated by both developing trust in an on-line

company and/or by putting extensive control mechanisms into place. Therefore, any on-line business should pay considerable attention to both building trust into their website through the use of clearly stated privacy policies, easy to invoke return policies, shipment tracking etc as well as building control mechanisms, perhaps through third parties, into their payment systems. This study suggests that failure to reduce these risks will result in lower sales.

Computer/Web self-efficacy is also highly related to on-line purchase intent. This suggests that businesses that are targeted to demographic groups with traditionally high computer/web self-efficacy should be more successful. On-line retailers would do well to study the reports of organizations such as Pew who frequently publish computer and Internet usage statistics to use as part of their due diligence and market research.

From a research perspective, while computers may be widely used in organizations, and thus computer self-efficacy is not a major issue in the use of the technology acceptance model (TAM) in organizations, it should be considered when used outside the organizational setting. The implicit assumption that computers are used in the workplace is not necessarily valid in other settings, therefore may be an effect in those settings for computer self-efficacy.

There was also a finding for the importance of Personal Innovativeness in on-line purchase intention. However, in a practical sense this finding is harder to put into practice. It is more difficult to identify people who enjoy and are stimulated by the use of technology outside of the arena of selling technical gadgetry. We suggest that future research attempt to find an alternative measure that can be used to tap this factor while still being easily identifiable. One such measure we found in the literature was enjoyment but again that tends to be a personal preference as to what an individual may enjoy and while important it is difficult to tap.

Based on this research we suggest that future research should concentrate on determining what the precursors to perceived usefulness in e-commerce might be. In an organizational setting these have been studied. For example, Venkatesh (2000) proposed a TAM2 extension of TAM that includes items such as image, job relevance, experience and output quality as precursors to Perceived Usefulness. Likewise, Venkatesh, Speier and Morris (2002) proposed an integrated model that includes such factors as training. However, outside the organizational setting the precursors to usefulness perceptions have remained virtually unexplored.

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