Intention to Buy Online: An Empirical Analysis

ABSTRACT

Behavioral Intention denotes the willingness of an individual to perform a certain action. Assessment of intention provides information that is helpful in determining the actual behavior. Online buying represents an activity, which is performed once an individual develops the intention. In view of the close association between the intention and the behavior, understanding and identifying the factors that influence the intention is important. This exploration can be more fruitful if the context of a behavior is given due consideration. Online buying shows a certain context in which technological, informational, individual, and socio-cultural factors interact. In view of this understanding, the current study proposes a model, which postulates that behavioral intention to buy online will be influenced by technological, individual, and informational factors. In addition to proposing the model, this study empirically validates it and draws the inferences informing the research and practice of information systems. In addition, this study addresses the call for more focused research on online buying and selling, and provides a framework that can be of aid for research studies that will examine online buying.

INTRODUCTION

Exchange has always been an important process in human lives. In the pre-industrial era, small towns and adjoining cities provided places where people could exchange their products, an exchange that was described as barter trade. With the industrial revolution, a change in the scope of human needs began. A greater demand for non-agricultural products necessitated the need to develop special marketplaces where people could buy different products in exchange for currency notes. Transactions became more numerous, and owing to a greater number of industries, competition increased. Corporations developed special departments, such as marketing, to disseminate information about products. Information became an important resource and pivotal to the diffusion of products and services.

Development of the Internet marked a new era that has extraordinarily impacted almost every sphere of human activities. The Web, a component of the Internet, has become a ubiquitous phenomenon. This development brought new meaning, similar to that of the industrial revolution, for trading. In terms of the use, availability, and various other properties, the Web has provided an opportunity for traders to present products/services to a wider section of the population at a lower cost. On the other hand, users have also found online buying/selling to be convenient and cost effective (Zhou, Dai, & Zhang, 2007).

Online buying has become an important way of satisfying user needs. According to Donthu and Garcia (1999), buying has become the most rapidly growing use of the Internet. In the U.S. it is estimated that online retail sales will grow at a 10% compound annual growth rate over the next five years and will reach to nearly $249 billion by 2014, whereas in the Western Europe the same figures have been estimated to be 11% compound annual growth rate and € 114 billion by 2014 (“Forrester Forecast,” 2010). The increasing importance of online buying has drawn attention from scholars. Success of a new technology depends on its adoption; therefore, different researchers started investigating factors that play a role in the adoption of online buying. This study presents a model that proposes the impact of technological, individual, and informational factors on intention to buy online.
SIGNIFICANCE

Theoretical Significance

There are differences in the behavior of individuals buying/selling online versus off-line, and these differences call for a different conceptualization (Cheung, Chan, & Limayem, 2005). Despite the growing research on online buying/selling it has been noted that “…the scope of studies is rather broad, studies appear relatively fragmented with contradictory findings…” (Cheung et al. 2005, p. 2), and “…the research on what drives consumers to shop online has typically been fragmented” (Monsuwe, Dellaert, & Ruyter, 2004, p. 102). The present study will be an important contribution toward addressing the call for more focused research on online buying/selling.

Practical Significance

Owing to the ubiquitous nature of the Web, many traders are using online buying/selling as a means to promote products and services. The growth of a business, however, partly depends on increasing the number of users for its products and services. In online buying/selling, like the physical marketplace, it is important to understand the properties, concerns, and values that shape the intention of a user to buy online. This understanding is important in attracting large numbers of users to online buying.

PURPOSE AND RESEARCH QUESTION

The primary research objective guiding this study is:

*To examine the nature of relationships between personal, technological, informational constructs and adoption of online buying.*

CONCEPTUAL FRAMEWORK

The primary objective of this research is to propose and validate a model that could portray the role of technological, individual, and informational factors in shaping the intention to buy online. Online buying is a technology-mediated practice and can be studied with the models that have been developed specifically for understanding the acceptance of technology. The technology acceptance model (TAM) (Davis, 1989; Figure 1, Appendix A) is one of the most widely used models to predict the adoption of technology. It is argued that this model is also applicable to investigate the adoption of online buying (e.g., Gefen, Karahanna, & Straub, 2003). This model provides a simple, yet robust, means to explore the acceptance of technology.

The technology acceptance model was developed within the discipline of information systems. This model proposed that the constructs of perceived ease of use and perceived usefulness would be fundamental in shaping the intention and influencing behavior relating to the acceptance of technology. The constructs of perceived ease of use and perceived usefulness, as outlined in the TAM, are important but not adequate to represent the influence of social environment on the individual’s intention to accept technology (Srite, 2000). Furthermore, the
nature of a research problem can also necessitate considering the inclusion of variables that are
pertinent to the investigation. During online buying, for instance, the factors of information
privacy-security, and Web content are of paramount importance and therefore warrant
consideration in research on online buying. Similarly, personality traits relevant to the
phenomenon of adoption also deserve attention. To better assess the adoption of
online buying, this study extends the technology acceptance model by including constructs of
personal innovativeness, and information privacy-security. (Figure 2, Appendix A)

LITERATURE REVIEW AND HYPOTHESES

Direct Influence

The proposed model uses the technology acceptance model (Davis, 1989) as the primary
model and extends it with the constructs of personal innovativeness and information privacy-
security. The nature of the relationship between the predictor variables and intention to buy
online was examined using multivariate method of Structural Equation Modeling (SEM). Below
is the description of literature and relevant hypotheses.

Perceived Usefulness (PU)

Perceived usefulness is an important determinant of usage intention and is defined as “the
degree to which a person believes that using a particular system would enhance his or her job
performance” (Davis, 1989, p. 320). Perceived usefulness represents the perception of the user
about the possible benefit to be gained by learning or adopting a technology for the first time.
Perceived usefulness has been found to be a significant predictor of attitude toward usage and
actual use. According to Lin and Yu (2006), “Perceived usefulness has received extensive
empirical support through validations, applications and replications by researchers and
practitioners” (p. 113).

Perceived usefulness positively impacts intention to buy online. Along with the
technology acceptance model Pavlou (2003) used the theory of reasoned action to predict
acceptance of e-commerce and found perceived usefulness, along with perceived ease of use,
important in e-commerce acceptance. Chen, Gillenson, and Sherrell (2002) used the technology
acceptance model and the diffusion of innovations theory to examine consumer behavior in the
virtual store context and found perceived usefulness as having an important impact on attitude
toward using the virtual store. According to Monsuwe´ et al. (2004), the intention to buy online
depends on perceived usefulness, perceived ease of use, and on emotional as well as on hedonic
dimensions.

Based on the above discussion, the following is hypothesized:

\[ H_1: \text{Perceived usefulness will have a positive influence on intention to buy online.} \]

Perceived Ease of Use (PEU)

The perceived ease of use represents a person’s belief that usage of a particular
technology will be free of effort (Davis, 1989). Perceived ease of use, along with perceived
usefulness, has been found to be an important antecedent of adoption (e.g., Szajna, 1996). The study by Szajna (1996) was a longitudinal research study in which perceptions about the ease of use and usefulness of an electronic mail system along with the intention to use and the actual usage were measured. He found support for the constructs of perceived ease of use and usefulness, and also suggested that the experience component should be added to the technology acceptance model.

McCloskey (2003/2004) used the technology acceptance model to evaluate the acceptance of e-commerce and found that “ease of use has a direct effect on whether a consumer will make an online purchase” (p. 53). Heijden, Verhagen, and Creemers (2002) found perceived ease of use, along with perceived risk, as important variables that influence the attitude toward purchasing online. The role of perceived ease of use in adoption has also been recognized in different countries. Guriting and Ndubisi (2006) found perceived ease of use and perceived usefulness as strong determinants of behavioral intention to adopt online banking in Malaysia; Pagani (2004) found perceived ease of use and perceived usefulness along with price and speed of use as important determinants of mobile service adoption in Italy.

On the basis of above discussion, the following is proposed:

\[ H_2: \text{Perceived ease of use will have a positive influence on intention to buy online.} \]

**Mediating Role of Perceived Usefulness**

Davis (1989) suggested that perceived ease of use will operate through perceived usefulness, and this claim was supported by numerous studies (e.g., Chin & Gopal, 1995; Gefen, 1997). Through perceived usefulness, perceived ease of use affects the attitude directly as well as indirectly. Gefen and Straub (2000) found that perceived ease of use impacted perceived usefulness, which in turn influenced the intended inquiry and intended purchase. The indirect influence of perceived ease of use was also found in studies conducted outside North America. Pagani (2004) presented a model proposing the determinants of mobile service adoption. One of the hypothesized relationships was that perceived ease of use will influence perceived usefulness. The model was validated through a qualitative exploratory study, using subjects from Italy and U.S., and also tested empirically with data collected from subjects in Italy. Perceived usefulness and perceived ease of use emerged as one of the most important predictors of adoption. Additionally, he found support for the influence of perceived ease of use on perceived usefulness. On the basis of previous research, it is hypothesized that:

\[ H_3: \text{Perceived ease of use will positively influence perceived usefulness.} \]

**Personal Innovativeness (PI)**

Personal innovativeness shows the extent to which a person is willing to use a technology/product for the first time. The current study has used the definition of Agarwal and Prasad (1998) who defined personal innovativeness as “the willingness of an individual to try out any new information technology” (p. 206). Personal innovativeness has received considerable attention in consumer behavior research. According to Hirschman (1980), “few concepts in the behavioral sciences have as much immediate relevance to consumer behavior as innovativeness”
The affect of personal innovativeness on adoption has been recognized in different studies (e.g., Park & Jun, 2003; Venkatraman, 1991). Park and Jun (2003) examined the differences between Korean and American subjects in terms of Internet usage, Internet innovativeness, perceived risks of Internet buying, and Internet buying behaviors. Their model proposed that innovativeness will influence Internet shopping intention. They found that innovativeness influenced the online shopping intention in subjects from both countries; however, they did not find any interaction between the nationality and innovativeness.

Online buying is a practice that represents a departure from established conventional buying in the markets. The adoption of online buying can involve a comparison of the pros and cons associated with traditional versus virtual buying. A person intending to adopt; therefore, has to be willing to deal with large amounts of information as well as associated risks/choices available in two different modes. Innovativeness motivates a person to learn more about new alternatives (e.g., Citrin, Sprott, Silverman, & Stem, 2000) and to take risks (e.g., Steenkamp, Hofstede, & Wedel, 1999). Online buying can involve greater risk and may also require a comparison of alternatives available both on the Web and in the traditional marketplace; therefore, it can be argued that innovative individuals, owing to their willingness to try, will have a stronger inclination toward online buying. The inclusion of personal innovativeness in technology acceptance models is proposed. For instance, Agarwal and Prasad (1998) suggested that personal innovativeness is an important individual-level variable and should be included in the technology acceptance model. Also they argued that the inclusion of personal innovativeness can help to understand development of perceptions (regarding information technology) and their role in formation of usage intentions; hence it is proposed that

\[ H_4: \text{Personal Innovativeness will have a positive influence on intention to buy online.} \]

**Informational Traits**

In the online environment, information occupies an important position. Traders disseminate information to promote products and services. This information facilitates users’ decisions. However to complete transaction online, personal information has to be provided. The provision of personal information helps to complete a transaction but also poses a possible risk to the user. Failure to restrict the unauthorized access to personal information may result in breach of privacy and reduce the trust in the security features of a Web site. Considering the importance of and increasing concerns regarding information privacy-security this construct has been added to the technology acceptance model and conceptualized as influencing the intention to buy online.

**Information Privacy-Security**

**Information Privacy**. “Privacy is the condition of limited access to identifiable information about individuals” (Smith, 1993, p. 106). In relation to online buying/selling, the concern about privacy is developing among consumers across the board (Culnan & Armstrong, 1999). The intention to complete a transaction is heavily influenced by the extent of the available privacy. E-commerce adoption greatly depends on the satisfaction with concerns about privacy (Bakke, Faley, Brandyberry, & Troutt, 2005). Lee (2002), while commenting on the various
concerns of online consumers, describes privacy as one of the important concerns. During 2000-2004, slow growth of e-commerce was attributed to slow economic growth and increasing privacy concerns among consumers (McCloskey, 2003/2004).

Adoption of online buying depends partly on the nature of experience felt by the prospective customers. An unfavorable experience may lead to reluctance in the adoption of online buying. Privacy breaches can impede consumers from accepting e-commerce (Bakke et al. 2005). Satisfying the user information privacy concerns leads to building of trust and a willingness among users to adopt new means of trade and exchange. According to Zviran (2008), users with an increasing privacy concern may become reluctant to provide complete information and use the Web.

**Information Security.** Security is “the quality or state of being secure to be free from danger” (Whitman & Mattord, 2003, p. 9). Information security is related to technical aspects of online buying. Though online buying is expanding at a great pace, the concern about information security is also increasing. Information security encompasses all those measures that are necessary to protect privacy. Online trade helps users buy products/services by investing a minimum amount of time and effort. The virtual mode reduces the search costs as well as the opportunity cost of time involved in making a transaction (Bakos, 2001). However, if users have doubts about the security of their information or have concerns about the security of the information system in use by an online seller, these concerns could outweigh the benefits offered by an online transaction. The concern with the security of data and of physical assets has drawn attention from both corporations and consumers (Davis, 1997). Concerns with the security and privacy of information represent important impediments to the adoption of online buying. While Han and Noh (1999) found low data security as an impediment to e-commerce adoption, Lee (2002) found that security along with privacy can help in building the trust of an individual toward online purchases. Privacy and security have been classified as important components of merchant and intermediary characteristics and have been proposed as factors that influence intention, adoption, and continuance of consumer online experiences (Cheung, Chan, & Limayem, 2005). Information security has become an important concern for users, and satisfaction of this concern is important for the adoption as well as expansion of online buying. The following hypothesis is proposed:

\[ H_5: \text{Information privacy-security concerns will have a negative influence on user intention to buy online.} \]

Based on the above-mentioned discussion, the model in Figure 4-Appendix A was proposed.

**RESEARCH METHOD**

**Research Approach**

The research objective of this study was addressed through a quantitative approach using student subjects at a state university in the Midwestern U.S. Using a survey questionnaire data was collected in a classroom setting. The survey method was chosen to ensure provision of the amount of data required for the quantitative approach of Structural Equation Modeling (SEM).
With a survey, data can be collected spontaneously, inexpensively (Whitten & Bentley, 2007) and in a short period of time (McNeill & Chapman, 2005). Data was analyzed using descriptive and inferential statistics; Statistical Package for the Social Science (SPSS™ 18.0) was used for that purpose. The proposed model (Figure 3, Appendix A) was tested with a multivariate data analysis technique of “Covariance based-Structural Equation Modeling” using software called “Linear Structural Relations (LISREL™ 8.80).”

**Operational Definitions**

Definitions of the constructs used in this study are shown in Table 1 (Appendix A). The terms constructs and variables are used interchangeably in this study. Measurement of a phenomenon begins with correct definitions (Hair, Black, Babin, Anderson, & Tatham, 2006); the accurate conceptualization of a construct, through definition, is important to assess its dimensions. This conceptualization leads to the development of a scale that operationalizes a construct. Definitions, as well as measurement scales of constructs, have been adapted from the studies that conceptualized the phenomenon, developed the scales, and validated them through empirical examination.

**Survey Questionnaire**

In this study, research question was concerned with testing of hypothesized relationships between independent constructs (perceived usefulness, perceived ease of use, personal innovativeness, information privacy-security) and the dependent construct (intention to buy online). A survey was used to collect data for the proposed relationships. Survey methodology was used, as it is an important tool “…to produce quantitative descriptions of some aspects of the studied population” (Pinsonneault & Kraemer, 1993, p. 77). The quantitative description is verifiable; the survey itself is easily replicable and enables a researcher to gather large amounts of data in a relatively short period of time (McNeill & Chapman, 2005).

The questionnaire was developed by using the questions from previous studies. If instruments for any of the constructs were not available in the literature, the researcher developed the questions and used statistical procedures to estimate their validity and reliability. Details regarding the questionnaire, e.g., studies from which the question items were adapted, the abbreviations of constructs, and the number of questions relevant to each construct are presented in Table 2 (Appendix A). Questions were adapted from these studies because constructs were developed and validated in them. While choosing questions, the contextual similarity of the studies was also considered. All the scale questions, except questions relating to demographics and computer/Internet literacy, were Likert type statements on a 5 point scale, where one represented strongly disagree and five strongly agree. The survey questionnaire was pilot tested for validity and reliability.

**Participants & Research Design**

**Participants.** A convenience sample of the student body at a Midwestern university served as the population. The student population was used, as it provides reduced variability in data (Peterson, 2001) and ease of access. Voich (1995) noted that workers and students possess the same values and beliefs. According to Robertson and Hoffman (2000), the use of student
subjects is reasonable when the objective of a study is to examine every-day cultural values. Based on the analysis of various meta-analytic studies, Peterson (2001) concluded that the variability in responses within a construct and among constructs is less for students than for non-students.

**Research Design.** The research problem dealt with testing of the relationship between various independent constructs (e.g., Personal Innovativeness, Information Privacy-Security, etc.) and a dependent construct (Intention to buy online). The predictive ability of an independent construct can be ascertained by calculating the correlation or covariance between an independent and a dependent construct. There can be different types of relationships among constructs (for example, a dependence relationship where one construct depends on another-dependence relationship, a construct acting as an independent construct in one relationship but becoming a dependent construct in another, and a construct moderating the relationship between two constructs-moderating relationship). The empirical validation of these relationships enables a researcher to test the hypothesized model and further the process of theory construction.

After specification of relationships among constructs, the researcher develops a structural model to represent the proposed relationships (e.g., Figure 3, Appendix A). In addition to the structural model, a measurement model is also developed. The measurement model describes various items/questions that, according to the researcher, operationalize the constructs in the best manner (Figure 4, Appendix A). Development of structural and measurement models leads to a phase where different statistical procedures are applied to test the validity and reliability of the postulated models. Depending on the nature of the method applied, the nature of these statistical procedures varies. For example, if regression analysis is used as a method, Exploratory Factor Analysis (EFA) and Cronbach’s α are used to test the validity and reliability, respectively, of the measurement model, and regression analysis is applied to test the validity of the structural model. However, if statistical procedures, like Structural Equation Modeling (SEM), are used, Confirmatory Factor Analysis (CFA) is used to test the validity and reliability of the measurement model, and relevant SEM technique (Covariance-Based, Partial Least Squares) is used to test the structural model.

The validation of postulated relationships, in regression analysis, both in the measurement and structural model, requires the running of different analyses, depending on the complexity of the relationships involved. For example, EFA and reliability test are required to examine validity and reliability. After these procedures, regression analysis is applied. If, however, multiple relationships (dependence, moderating) exist, then regression analysis would have to be applied multiple times. In addition, the measurement and the structural model will be analyzed in complete isolation of each other. This limitation leads to various constraints; for instance, the underlying causality can be misinterpreted, as no single run can dissect all of the variance in a complex research model (Gefen, Straub, & Boudreau, 2000), which limits the use of regression analysis in circumstances that involve dependence, independence, and moderating relationships, present in a single model, among constructs.

**Structural Equation Modeling (SEM)**

Structural Equation Modeling is a group of techniques that addresses some of the limitations associated with regression analysis and also provides more robust application of statistical procedures. It is a family of statistical procedures that depicts multiple relationships
among constructs through the use of equations quite similar to multiple regression equations. However, an important distinction between SEM and regression is the ability of SEM to model multiple relationships among independent and dependent constructs simultaneously (Hair et al. 2006). Another feature of SEM is its ability to test the measurement and structural model in one analysis. On the other hand, different and somewhat unrelated analyses are required in regression analysis to perform the same task.

Structural Equation Modeling can be performed by using different techniques. Covariance analysis and Partial Least Squares are two notable SEM techniques. These techniques differ in their underlying statistical assumptions and objectives of analysis (Gefen et al. 2000). Numerous softwares are available to perform these two types of analyses, e.g., LISREL, AMOS, EQS for covariance analysis and PLS for partial least squares.

**Covariance Analysis.** Covariance analysis examines the plausibility of the hypothesized model; it tests whether the proposed model is supported by the data. The validation of the proposed model shows that the operationalization of the theory under examination has been confirmed (Gefen et al. 2000). Structural Equation Modeling techniques are described as second generation data analysis methods (Gefen et al. 2000). Covariance-based SEM is appropriate to test the validity of the framework that is used to develop a set of hypotheses. In the current study, the proposed model represented constructs and relationships, some of which have been validated by previous research and shown to have an influence on the intention to buy online. Covariance-based SEM confirms or disconfirms the proposed model based on observed data. The preceding features of covariance-based SEM were in accordance with the objectives of the present study and facilitated in choosing SEM for the validation of the proposed model.

**Pilot Test**

**Description.** In the latter half of spring and early summer of 2009, the instructors in various departments were contacted to seek their support for the administration of the survey. Subsequently, the survey was administered in a class room setting. Brief instructions regarding the survey, purpose of the study, and the rights of participants were explained. A total of 73 respondents completed the survey. Six of the surveys were discarded owing to lack of information leaving a total of 67 usable surveys.

**Reliability and Validity**

**Exploratory Factor Analysis.** Exploratory Factor analysis is a statistical tool that can aid in assessing the extent of a construct’s discriminant and convergent validity. These two facets of validity are considered to be vital in demonstrating the ability of a question/item to measure a construct. Factor analysis entails certain conditions that ought to be met in order to make the analysis valid. For instance, it is recommended that for every question there should be 7-10 observations; the determinant of the correlation matrix should be more than .00001; and sample should be adequate not only for the whole study but also for individual measures (Field, 2005). In view of the sample requirements, it was not statistically reasonable to run a single factor analysis including all the questions. Therefore, as recommended by Srite (2000) separate Factor analyses, including related constructs, were run to obtain clean factor loadings. Some items were dropped, basing on the theoretical and empirical considerations, during re-analysis. The resulting
factor matrices are presented in Tables 3 and 4 (Appendix A). The reliability values for all the constructs were calculated and are presented in Table 5 (Appendix A). All of the reliability values exceeded the recommended value of .70 (Nunnally, 1978). The next step was to conduct the full-scale examination of the measurement and structural model and to ascertain the extent to which the hypothesized relations were supported.

**DATA ANALYSIS**

This section describes the data collection for the final phase of the study, the procedures that were adopted in ensuring the accurate recording and transferring of data, extent to which data was missing, demographics and associated descriptive statistics, and the method that was used in testing the model. The later section explains the results and provides a synopsis of the findings.

**Data Integrity Checks**

**Data Transfer Accuracy**

To ensure the accuracy with which the data was transferred from the surveys to excel spreadsheets and finally to SPSS, every 10th observation was inspected visually and data values were matched among the actual survey, excel spreadsheets and SPSS data files.

**Data Values Accuracy**

The range for all the variables (except for non-quantifiable, that is, string variables) included in the survey were calculated. This calculation provided the maximum and minimum values for each of the variables. These values were compared with the values assigned to these variables during data coding process. This exercise helped to identify, if any, a value that was out of the specified range and may have resulted in recording an observation with error.

**Missing Data**

Missing data can become quite problematic depending on the magnitude of missing values. For instance, if the missing data is more than 10% for a variable (question) and has a systematic pattern of occurrence then it warrants a remedy (Hair et al. 2006). The missing data in this study was less than 2.5% in case of all of the variables. The missing values in these observations were replaced with the mean values.

**Response Rate**

A total of 411 surveys were distributed to the participants during their class sessions. All of the 411 surveys were collected by the researcher; out of which 5 surveys were discarded owing to excessive omissions. This left the total number of usable surveys to 406 (98.78%).

**Demographics**

A number of questions, in the demographics and Internet-Web use sections, provided information regarding different characteristics of the sample. The details pertaining to them are provided in Tables 6 and 7 (Appendix A).
Exploratory Factor Analysis

Exploratory Factor Analysis (EFA) was done using SPSS™ 18.0. All the independent constructs were factor analyzed together. The factor analysis was done using the ‘Varimax’ rotation method and the factor loadings less than .4 were suppressed. To have clean factor loadings, items were dropped one by one. The items were dropped not only on empirical basis but also a due consideration was given to retain the content validity. Several factor matrices were run and after dropping problematic items, a clean factor structure emerged for online buying model (Table 8, Appendix A). An important element was the loading of PEUB1 on factor representing perceived usefulness. This item (PEUB1) was not eliminated despite its loading on factor1 because doing so resulted in a negative Cronbach alpha. This factor matrix explained 60.23% of the variance and has a sampling adequacy value of .856. The factor matrix, except of PEUB1, of online buying model presented a clean loading structure. The final reliabilities along with the number of items in each scale are presented in Table 9-Appendix A. All the scales met the reliability criterion, set by Nunnally (1978), to have a Cronbach alpha of .70 or above.

The analysis of the descriptive statistics (Table 10, Appendix A) provides important information about the orientation of the sample in terms of the constructs of this study. As far as the independent and dependent constructs are concerned, the sample exhibited the following traits: for example, the sample had a moderate innovative orientation (PIB mean = 2.82, Table 10); the participants perceived online buying as easy to use (PEUB mean = 3.43, Table 10). Similarly, online buying was perceived by the subjects to be useful (PUB mean 3.50, Table 10). Information privacy-security were considered quite important impediments in terms of the use of online buying (PRSB mean = 3.84, Table 10). Regarding potential future use, the sample exhibited a strong intention to use online buying (BIB mean = 3.45, Table 10).

The analysis, above, prepared the grounds for the next phase of the study which included the assessment of the measurement and structural models using confirmatory factor analysis and covariance-based SEM respectively.

Confirmatory Factor Analysis

Application of statistical approaches like SEM requires the use of Confirmatory Factor Analysis (CFA) to test the measurement theory. Once the measurement theory is tested then the structural model can be tested using appropriate SEM approach. CFA tests the underlying theory that has been used to develop a measurement model (Hair et al. 2006). A researcher has to specify the number of factors as well as the relationship between the variables and variates (constructs) before applying CFA; a requirement that is not existent in case of exploratory factor analysis. CFA then matches the specification of factors with the reality (i.e. the actual collected data), and by doing that CFA provides the information which either validates or rejects the theory that has been used to develop the measurement model. The use of CFA also enables a researcher to examine the construct validity, a composition of ‘convergent, discriminant, nomological, and face validity’ (Hair et al. 2006). To test the measurement theory of the proposed model and to examine the construct validity, CFA was done using LISREL™ 8.80. There are certain guidelines (as provided in Hair et al. 2006) that can be helpful in using CFA and thus have been applied in this study. To assess the overall validity of the measurement model, the researcher has to assess (a) overall fit of the model, and (b) construct validity. Overall fit of the model can be assessed using certain key fit statistics provided in most of SEM
softwares. For example, Chi-square $\chi^2$ statistic, Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA). As far as construct validity is concerned, significant information is also provided, within SEM, to assess convergent, discriminant, and nomological validity.

**Overall Fit of the Model**

To assess the overall fit of the measurement model the key fit statistics were calculated. All of the fit statistics discussed below are provided in Table 11 (Appendix A). The overall model-buying $\chi^2$ was 176.34 with 80 degrees of freedom. The $p$-value associated with this result was 0.0000. This $p$-value was significant using type I error rate of .05. The RMSEA value was 0.055, which was below the recommended value of 0.10 (Hair et al. 2006). The CFI for the buying model was 0.98, which was above the recommended value of 0.90 (Hair et al. 2006). Basing on the above analysis it can be suggested that measurement model exhibited a reasonable level of fit. The next step was to analyze the construct validity.

**Construct Validity**

“Construct validity is the extent to which a set of measured items [questions] actually reflects the theoretical latent constructs those items are designed to measure.” (Hair et al. 2006, p. 776). It deals with the accuracy of measurement. Construct validity is made up of four important components (Hair et al, 2006): these include convergent, discriminant, nomological, and face validity. Below is the brief description of each and their assessment in this study.

*Convergent Validity*

It denotes the extent to which items representing a construct share a variance in common. There are some ways to estimate the convergent validity. Hair et al. (2006) suggested the use of the following three measures to assess the convergent validity. The information relating to these measures is provided in Table 12-Appendix A.

(a) **Factor Loadings.** It represents the magnitude of correlation or covariance between an item and a construct. Higher loading shows that items have stronger relationship with a construct and are thus converging at a common point. A rule of thumb is that standardized loading estimates should be 0.5 or higher, and ideally 0.7 or higher (Hair et al. 2006). The standardized factor loadings for all the items were greater than 0.5, threshold level, in the model. Majority of items loaded above the recommended level of 0.7 (Table 12, Appendix A).

(b) **Average Variance Extracted.** According to Fornell and Larcker (1981) the average percentage of average variance extracted (AVE) among a set of construct items shows convergence. An ‘AVE’ of 0.5 or higher indicates adequate convergence. All the AVE values, except for the constructs of PEUB (0.35), were above the 0.5 (Table 12, Appendix A).

(c) **Reliability.** There are different measures of reliability; however, coefficient alpha remains a commonly used reliability measure. Within the context of SEM a slightly different construct reliability is calculated from the squared sum of factor loadings ($\lambda^2$).
for each construct and the sum of error variance terms for a construct ($\delta_i^2$) (Hair et al. 2006). Reliability value of 0.7 or higher suggests good reliability; however, a value between 0.6 and 0.7 can be acceptable depending on the quality of the other indicators of construct validity (Hair et al. 2006). High reliability represents internal consistency, that is, the items are representing the same latent construct. The reliability values for all of the constructs were calculated. The reliability values for all the constructs, except that of PEUB (0.62), were above 0.7 representing adequate construct reliability (Table 12 Appendix A).

In view of the three measures, that is, factor loadings, average variance extracted, and construct reliabilities it can be stated that the measurement model (Figure 4, Appendix A) has exhibited satisfactory convergent validity.

**Discriminant Validity**

According to Hair et al. (2006) discriminant validity can be ascertained by comparing the variance-extracted estimates for each factor with the squared inter-construct correlations associated with that factor. The variance-extracted estimates should be more than the inter-construct correlations. This comparison was done in the measurement model. Only in case of PEUB the AVE was less than the squared inter-construct correlations. The AVE of PEUB was 0.35, whereas squared inter-construct correlation between PEUB and PUB was 0.547. The values of AVE versus squared inter-construct correlations are provided in the Table 13 (Appendix A).

**Nomological Validity**

To assess the nomological validity, one can start from examining the correlation matrix. The correlation among constructs, the one that was predicted within the theoretical network, validates the theoretical base of the measurement model. Besides this examination, it is important to analyze the structural model to assess the magnitude of coefficients, their significance, and direction to ascertain the nomological validity. The correlation matrix of constructs was examined (Table 14, Appendix A). The construct of personal innovativeness in this study was measuring innovativeness and was predicted to have a positive correlation with the behavioral intention to buy. Perceived usefulness and perceived ease of use both had positive correlation with personal innovativeness. The constructs of information privacy-security and personal innovativeness had negative relationship; perceived usefulness had a positive correlation with perceived ease of use; information privacy-security had a negative relationship with behavioral intention. Perceived ease of use and perceived usefulness both had negative correlation with information privacy-security. The correlation matrix revealed a pattern that was consistent with the established theoretical stream in the literature as well as the predicted relationships within this study.

**Face Validity**

There is no empirical test to establish the observational meaningfulness of concepts (face validity). According to Srite (2000) the confidence in face validity of the instrument, used in a study, can be increased by using the scales that have been previously validated. In the current
study the scales were used that were validated in the literature; for example, the scale of personal
innovativeness was validated by (Citrin et al. 2000), perceived ease of use and perceived
usefulness by (McCloskey, 2003/2004), information privacy-security by (McCloskey,
2003/2004; George, 2000), and behavioral intention by (Srite & Karahanna, 2006; Akour et al.
2006). Some items were re-worded to increase the relevance with the context of the present study
and were then examined using reliability and validity procedures to assess their overall validity.

Model Testing

Hair et al. (2006) states that the testing of structural model within SEM focuses on two
issues:

(1) The overall and relative model fit
(2) The size, direction, and significance of the structural parameter estimates,
depicted with one-headed arrows on a path diagram

Following steps were taken to assess the overall and relative model fit of buying model. Below is
the description of that process:

The overall and relative model fit

The loading estimates of all the measurement items were examined to ensure that they
have not changed substantially from the CFA model. All but three items’ loadings changed and
the maximum change was .02. The overall buying-model $\chi^2$ was 178.65 with 82 degrees of
freedom ($p < .05$). The RMSEA was 0.054, whereas the CFI was 0.98 (Table 15, Appendix A).
These diagnostics suggested that the structural model provided a good overall fit.

Size, Direction, and Significance of the Structural Parameter Estimates

The next step, after the examination of model fit statistics, was to analyze the individual
parameters. Their size, direction, and significance all had to be examined. All of the structural
paths, except one, were significant. The insignificant path was between PRSb and BIB; the
coefficient value was -0.02 with a $t$-value of -0.58, which falls below the critical $t$-value for a
Type I error of 0.05. Although the estimate was in the predicted direction; however, was not
significant to support the hypothesis. The coefficients of paths from perceived usefulness (PUB),
perceived ease of use (PEUB), and personal innovativeness (PIB) to behavioral intention had
values of 0.56 ($p < .01$), 0.17 ($p < .10$), and 0.15 ($p < .01$) respectively (Figure 4, Appendix A). The
coefficient of path from perceived ease of use to perceived usefulness was 0.76 ($p < .01$). Besides
examining the preceding, other fit statistics were also analyzed. For instance, the SRMR
increased to 0.044 from 0.042, a value associated with good fit. The difference in fit between the
structural model and the CFA model was also calculated. The resulting $\Delta \chi^2$ was 2.31 with 2
degrees of freedom. The difference in degrees of freedom was due to the fact that all but two of
the possible structural paths were estimated. The insignificant $\Delta \chi^2$ suggested that the fit of the
model may not improve by estimating another structural path.

Presentation of Results

As far as the hypothesis pertaining to the direct impact of independent constructs on the
dependent construct are concerned, the influence of perceived usefulness ($H_1$), perceived ease of
use ($H_2$), and personal innovativeness ($H_4$) on behavioral intention was significant. Information
privacy-security concerns (H5) did not have a significant influence on behavioral intention in the buying model. The relationship between information privacy-security and behavioral intention was in the predicted direction yet not significant. The mediating role of perceived usefulness (H3) was significant (Table 16, Appendix A). The overall R² value for the model was 0.61, that is, 61% of the variation in behavioral intention to buy online was explained by the independent and mediating constructs.

DISCUSSION, CONTRIBUTIONS, AND FUTURE DIRECTIONS

The section below discusses the results of analysis in greater detail; explains the limitations; presents the contributions of this study. Finally, some of the future research threads are discussed and a conclusion is presented.

Discussion

Constructs Having Direct Influence

**Perceived Usefulness (PU)**

Perceived usefulness represents the perception of an individual pertaining to the benefit, which can be gained by adopting a new practice. However, the perceived benefit need not to be strictly related to the practice in question. More specifically, PU of a practice is formed by keeping in view the factors that are related to some other facets of an individual’s life and s/he considers the adoption of current practice as adding value to those other facets (see e.g., Gefen & Straub, 2000). PU found to be having a significant positive impact on behavioral intention. The path coefficient was 0.56 and significant at p-level of .01. This finding was consistent with the findings of numerous research studies of past. Gefen et al. (2003) posited that PU, PEU and trust along with other constructs will have an impact on the intention to purchase online. They found that PU was the most significant direct predictor of intended use.

In another research study, McCloskey (2006) examined the role of ease of use, usefulness, and trust in electronic commerce usage. She found that PU together with trust had a noteworthy influence on usage, whereas PEU had an impact on both PU and trust but not on electronic commerce usage. Having the finding pertaining to PU in line with the findings of other research studies strengthens the nomological validity of the theoretical framework of this study as well as of the network of hypothesized relationships.

**Perceived Ease of Use (PEU)**

Though the role of perceived ease of use is quite much contested but despite the controversy about its role, its importance in the adoption process cannot be downplayed. PEU shows the perception of a person about the extent to which use of a particular technology will be free of effort (Davis, 1989). It is related with the ideas of ease of use, ease of learning, and flexibility (Gefen & Straub, 2000); the concepts that are associated directly with the technology or practice in question. According to Gefen and Straub (2000) this is a noteworthy point because the direct (close) association of PEU with the technology itself necessitate that a researcher distinguish between the task and the technology used to accomplish this task. It is this conception
that, according to Gefen and Straub, has led to the conflicting findings relating to PEU in the adoption research. That is, if a research examined the adoption of a technology (e.g., effectiveness of searching information on a specific Web site) which was an end in itself (task was embedded in the technology) then most probably PEU emerged as a significant determinant of adoption (or intent to adopt). However, the case in which task was not embedded in the technology (e.g., buying online) then PEU, owing to its intrinsic nature, may not appear as an important predictor of the intention to use.

In the current study, PEU was significant but at p-level of .10. A possible explanation for this insignificant (at p-level of .05) impact can be given in the light of what has been presented above. That is, online buying represents a task which is not embedded in the Web-the technology in question. The Web is used as means to buy something so the outcome (buying) is distinct from the Web itself. Another plausible explanation can be a possible deficiency in theoretical meaningfulness of this construct that may have emerged during its operationalization.

**Personal Innovativeness (PI)**

Personal innovativeness signifies one’s willingness to adopt a new technology/practice. It represents the orientation that includes but not limited to risk taking, decision making independent of the other’s judgment, and learning about new alternatives. Personal innovativeness was predicted to have positive impact on intention to buy online, and this impact was found to be significant. The coefficient value of PI was 0.15 and significant at p-value of .01. The significance of PI has presumably shown that innovativeness is applicable to online buying. The preceding reinforces the validity of the description of innovativeness and its relevance in the adoption of a technology. An innovative person may like to adopt a new technology even if s/he has never used it before. The significant relationship has also validated the findings of other studies and strengthened the nomological validity of the theoretical foundation of this study. As far as previous research is concerned, Goldsmith (2000) noted that PI explains the intention of online buyers; Park and Jun (2003) found that PI impacts online buying intention for the subjects belonging to both Korea and America; however, they did not find any interaction between nationality and innovativeness.

**Information Privacy-Security**

A construct that captures the users’ concern regarding the access to personal information as well as their perception pertaining to the mechanisms in-place to safeguard the information from intrusions. Information privacy-security has been and is becoming a very important research topic. Though numerous studies have analyzed it but still there is a lack of coherent theoretical and operational framework that could be used to examine the role of information privacy-security in shaping individual behavior.

It was proposed in this study that information privacy-security concern will have a negative impact on behavioral intention of users. This hypothesis did not find support; the coefficient was, however, in the predicted direction (Figure 4, Appendix A). Lack of significant impact of information privacy-security has been noted in other studies too. For example, McCloskey (2003/2004) stated that despite having a mention of privacy-security concerns, in the literature, as an impediment to electronic commerce adoption, these concerns (in her study) did not appear to have a noteworthy influence on electronic commerce participation.
In a study by Miyazaki and Fernandez (2001), information privacy-security concerns were proposed to be negatively influencing online purchase rate. They found that though privacy was an important concern but still did not have a significant impact on the online purchase rate, whereas system security (a dimension of security in their study) did have a significant impact. In the context of aforementioned studies as well as the findings of this study, some plausible explanations can be given: though the participants considered the concern of information privacy-security important enough that it appeared in the predicted direction; however, this concern was still not as deeply rooted among the participants that could make it a restraining factor as far as intention to buy online is concerned; another possible reason can be the sample itself, that is, as the sample was a student population with majority of them (58.6%) between 17-22 years, they may even not considered the concern of information privacy-security in way that a population, more mature in age, may have considered. Another reason of having this finding can be the instability of the measuring scale itself; that is, the scale failed to measure the information privacy-security in a consistent manner.

*Construct Having Mediating Influence*

**Perceived Usefulness (PU)**

Mediators convey the influence of one factor towards another. To mediate, it is important that a mediator has a relationship with both, that is, one whose influence is being mediated and the other to whom it is being mediated. The role of PU as a mediator needs to be first examined by studying PEU, as it is PEU whose influence is being mediated. Davis, Bagozzi, and Warshaw (1989) in their study, that compared the Theory of Reasoned Action (TRA) and Technology Acceptance Model (TAM), analyzed the constructs of TRA and TAM; they wrote that PEU will influence the behavior through self-efficacy and instrumentality. The easier a system to use, greater will be the self-efficacy or sense of control over the use of a system. This feeling will directly impact the user’s intention to use a system; instrumentality, on the other hand, represents the role that the use of a system has in enhancing the performance. Davis et al. (1989) were of the opinion that instrumentality, which originates from PEU, will impact the intention through PU. As PU depicts the effectiveness of a technology in increasing the overall performance of a worker, along with potential benefits that may not related directly to the task at hand, therefore, instrumentality arising from the perception of ease of use should travel through usefulness. This assertion was supported through various studies (e.g., Chin & Gopal, 1995; Venkatesh & Davis, 1994), and corroborated further in the current study.

Mediating role of PU was significant, the coefficient of path from PEU to PU had a value of (0.76) (Figure 4, Appendix A) and significant at \( p \)-level of .01 with corresponding \( t \)-value of 12.07. In line of the discussion on the mediating role of PU, as presented in Davis et al (1989), it can be asserted that even if the direct impact of ease of use was not noteworthy (on intention) but still its influence in the form of instrumentality can impact PU and thus the intention. This finding possibly speaks to the two-dimensional influence of PEU as presented by Davis et al. (1989). The significance of structural paths joining PEU and PU has added strength to the nomological validity of the theoretical framework of this study; furthermore, emergence of significant mediating role of PU has also increased the validity of its role as a mediator which also being validated in various other studies (e.g., Gefen, 1997; Venkatesh, 1999)
CONTRIBUTIONS

The contributions of this study are twofold: one is to research and the other is to practice of Information Systems. Below is a discussion on both of these dimensions.

Information Systems (IS)

Research. IS has charged itself with the objective of designing systems that can transfer, store, transform, organize, preserve, create, manage, and facilitate the use of information. Once a system is designed to achieve the preceding, the realization of a system’s objective depends on its adoption and subsequent use. Web is a store house of an information (Ranganathan & Ganapathy, 2002), suggesting that it performs some of the functions of an IS, and its ability to perform these functions rests on its adoption. The research on adoption of Web for buying has examined the role of technological, personal, and organizational factors; despite having a plethora of studies on online buying and selling, the research on it is considered to be fragmentary along with contradictory findings (Cheung et al. 2005; Monsuwé et al. 2004). One of the factors contributing to this state is the lack of a theoretical framework including a store of concepts, which once conceptualized to be interrelated, could link all the involved concepts to the intention/adoption in a clear manner.

Present study has used the well-established theoretical streams/models of diffusion of innovations and technology acceptance model to develop a model that could represent, partly, the factors that impact the online buying. This theoretical framework may will prove to be a good foundation for future research on online buying, as it has integrated the concepts from diverse [yet relevant] traditions — an effort considered by Davis, Morrin, and Craig (1994) to be of value in constructing a valid theoretical framework. This study, by applying a more rigorous research method of SEM, has provided a methodological approach that will be useful in future validations. This study has thus made both a theoretical and methodological contribution to IS.

Practice. Design of an information system is of such an important nature that it must be carefully crafted to increase the chances of creating what is needed and also having a system accepted by a user community. Then design phase has to include the elements that are relevant to the purpose of a system and its prospects of adoption. The afore-mentioned considerations also apply to Web sites. The ubiquitous use of Web sites, as an information system or an interface between a system and a user, to serve diverse needs of users makes it important to consider the design phase very carefully and take into consideration a system-user perspective.

The present study has placed an enormous importance on the adoption of online buying using the Web. In doing so, it occurred that factors relating to the design of a Web site, e.g., ease of its use, visible information privacy-security features, along with in-built information privacy-security mechanisms, play an important role in its use. Usefulness, in this study, was not directly related to the design of a Web site. However, keeping in view its influence on the everyday life activities, it can be stated that consideration of usefulness of a system in meeting the immediate and non immediate task can be of great value at the design stage. From an adoption point of view, a well-integrated mechanism should be in-built in a system to protect information privacy-security. The information about this mechanism should be displayed visibly on the Web site. Consideration of ease of use, usefulness, and information privacy-security, among other, factors
at the design stage can be helpful in developing an information system that will be welcomed by a user population.

Pre-tests (alpha and beta) of an information system can help in assessing its effectiveness in achieving the objective and analyzing the users views about using that system. Depending on the characteristics of a system as well as the user population, pre-tests can be very challenging and sometimes even difficult to do. This study has found (like many previous studies) that people having innovativeness are quite receptive to the idea of using a new technology/practice and also in its adoption. In the case where it would be difficult to perform pre-tests it can be helpful to identify a user population with innovativeness. This can help to do the pre-test and also to have users’ views about the system.

Limitations of the Study

Limitations of a study inform a reader about the parameters within which the findings should be understood and interpreted. This helps a reader to clearly see the context and scope of a study. To achieve this purpose, limitations of this study are thus laid out. In the current study, the target population was student body at a mid-western university, representing certain demographical traits. It is quite possible that if the same phenomenon (online buying) is studied in a different population (e.g., working professionals) a different set of behaviors may emerge. Therefore, it is cautioned that the findings of this study are not generalizable to every set of population. Another limitation was that this study was cross-sectional in nature. That is, the data was collected at one instance. Owing to this limitation, some of the deeper traits of individual dispositions may have been overlooked.

Suggestions for Future Research

These suggestions speak to some of the riddles found in the data and also to theoretical underpinnings developed in this study and discussed in the literature.

1. Nature of task can influence the behavioral disposition of users; a matter that needs further examination. It is suggested that a task quite different from buying should be made as a focal point of study, and then the adoption of the Web for accomplishing this task should be examined.

2. Web is already in use at the libraries for seeking/searching information. It would be interesting to use some or all of the constructs proposed in this study to examine information seeking/searching. Studies of this nature may help to enhance our understanding about library information search.

3. A longitudinal study should be designed to examine the behavior of people using the Web for buying or another task. This exercise may help to unleash the changes, if any, in the nature and magnitude of independent constructs (personal innovativeness, perceived usefulness, perceived ease of use, and information privacy-security).

Conclusion

This study has attempted to address the call for more focused research on online buying. The preceding was achieved by integrating concepts from varied theoretical streams and
validating the proposed theoretical network through the Structural Equation Modeling. By doing so, the current study has contributed to the prospective theory of online buying; and developed a perspective, which is relevant to a wide range of phenomena operating in the discipline of Information Systems. This study, therefore, contributes to both the research and practice in Information Systems.

REFERENCES


