CONCEPTUALIZATION AND MEASUREMENT OF PERCEIVED RISK IN ONLINE SHOPPING

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There has been growing interest in the business value of electronic commerce, but little research has addressed the underlying motives and cognitive factors that influence consumer intention to adopting this medium. This paper attempts to fill this void by examining one of the predicators of online shopping, risk perception. Accordingly, the purpose of this article is to describe the development and validation of a reliable, unidimensional, and valid scale to measure the perceived risk in online shopping. This scale is domain specific, and will provide maximum usefulness to electronic marketers.

INTRODUCTION

Online shopping has received enormous attention in both the academic and popular press over the last five years. ComScore Media Metrix, Inc., projects online retail spending in the U.S. to reach $130 billion (USD) by 2006 (Petersen 2002). Forrester Research predicts U.S. e-commerce sales will reach $230 billion by 2008 (Cantwell 2003), indicating that online retail sales will steadily increase at a 19 percent year-over-year growth. Not only is the dollar amount of online sales growing, this channel's portion of overall retail sales continues to increase, and the online portion is predicted to reach 10 percent by 2008 (Cantwell 2003). Online retailers saw a 24 percent increase in sales in 2004, and projections for 2005 are to achieve another 22 percent increase (Burns 2005). Online 2004 holiday seasonal sales tracked at 29 percent over the 2003 holiday season (Mudd 2004). The Census Bureau estimated online retail sales for the second quarter of 2005 at $19.8 billion, up 25.7 percent from the second quarter of 2004 ("E-commerce Sales Rise 26% Year Over Year, Commerce Department Reports" 2005). According to Patti Freeman Evans, Jupiter Research, "the Internet continues to grow as a percent of total retail sales, and we project it reaching 5 percent by 2008 (Greenspan 2004)."

While these statistics may position online retailing as a fast track opportunity for generating more sales, problems do exist. Many surveys have reported that most Internet surfers are not conducting online transactions because they are concerned about Internet security. Internet shoppers have apprehension about passing along their credit card numbers and other confidential information on the Internet (Hass 1998; Minahan 1997; Romani 1998). Consumers are concerned that online businesses would give their personal information to other firms without their knowledge. Moreover, Internet fraud is another growing concern. Online shoppers are concerned about the inability to confirm the legitimacy of electronic businesses. Also, it is reported that online shoppers tend to be more risk takers than non-online shoppers (Donthu and Garcia 1999).

Furthermore, it can be suggested that the use of the Internet for shopping and other activities might result in some social and psychological concerns. People have a strong need to be loved by others and to play a part within social interactions. However, the impersonal nature of the Internet poses a threat to humans' social

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needs of "being in touch" (Cole and Cole 1998). With the increasing usage of the Internet, the social interaction with family members and other social groups may be reduced (Patterson and Kraut 1998; Sanders, Fields, Diego and Kaplan 2000). A study by the Stanford Institute for the quantitative Study of Society found that there is a negative relationship between the time spent online and the time spent in social interactions with family and friends (Dolliver 2000). These results have been seen as an indication that high Internet use is associated to weaker social ties and social isolation (Cole and Cole 1998; Dolliver 2000; Sanders, Fields, Diego and Kaplan 2000).

Given the amount of risk that online shopping may involve, it is both practically and theoretically plausible to propose that risk-averse consumers are not likely to shop online, or are likely to delay the online shopping choice. Thus, it is expected that frequent Internet shoppers would have a low need for security. Stated differently, shoppers who perceive online shopping as a highly risky decision are less likely to shop online. That said, it is possible to attempt to develop and test a reliable, unidimensional, and valid scale to measure the perceived risk in online shopping.

If consumer researchers could accurately measure the differences among consumers in their risk perception of online shopping, they could formally test theoretical models of consumer motivation in which perceived risk is thought to play a role. A reliable and valid scale will allow them to do this. Furthermore, if marketers had a simple and reliable measure to determine which consumers are risk-averse, they could then fine tune their promotions and marketing strategies to better reach these risk-averse consumers. Hence, a measure of risk perception as a predictor of online shopping would be important to both researchers and managers. Prior to reporting scale development, the notion of perceived risk is elaborated and prior attempts to measure this construct are reviewed.

THE NOTION OF PERCEIVED RISK

To determine the appropriate measurement approach for perceived risk, it is necessary to examine the nature of the construct itself. The concept of perceived risk was originally introduced by Bauer as a psychological, subjective construct to explain such phenomena as information seeking and brand loyalty (Bauer 1967). Although there may be many reasons why studying perceived risk is important, Mitchell (1999) contends that there are three reasons that underlie the importance of studying consumer perceived risk. First, perceived risk theory has intuitive appeal and plays an important role in facilitating marketers seeing the world through their customers' eyes. Second, it can be applied to a wide array of marketing applications. Third, it is suggested that perceived risk is more influential at explaining consumers' behavior since consumers are more often motivated to avoid mistakes than to maximize utility in purchasing decisions.

Cunningham (1967) defined risk as "the amount that would be lost if the consequences of an act were not favorable, and the individual's subjective feeling of certainty that the consequences will be unfavorable." Risk can be defined as the "variation in the distribution of possible outcomes, their likelihoods and their subjective values (Mitchell 1999)." Based on these definitions risk is defined in this paper as the expectations of any loss or any negative consequences as a result of online shopping.

More recent research by Forsythe and Shi (2003) demonstrates the relationship between types of risk perceived by Internet shoppers and their online patronage behaviors. Four types of perceived risk were examined in the context of online shopping: financial, product performance, psychological and time/convenience loss. Findings indicated perceived risk may have differing impact on consumers' online shopping behavior, relative to familiarity and experience with online shopping. Bhatnagar and Ghose (2004) examined security risk and product risk perception, and their respective effects on consumers' choice to shop online. Findings from

this study indicate one segment of shoppers that perceive product and security risk as high for online shopping, this risk having a major impact on this group's online shopping behavior.

MEASURES OF PERCEIVED RISK

Despite the various dimensions of perceived risk suggested in the literature, multiple measures of these constructs are scant in the marketing literature (Stone and Gronhaug 1993). However, some recent empirical studies concerning perceived risk have used multidimensional measures of various dimensions of perceived risk (Jacoby and Kaplan 1972; Stone and Gronhaug 1993). After reviewing relevant literature on perceived risk, it can be argued that perceived risk is multifaceted and that its essence cannot be captured by a single concept. There are a variety of risk types that have been suggested, including financial, performance, physical, social, convenience, and psychological risk (Jacoby and Kaplan 1972; Peter and Tarpey 1975). In addition, some other dimensions of risk such as source credibility (McCorkle 1990) time (Roselius 1971), and privacy (Elliot 1995) are likely to be associated with electronic shopping. In fact, it can be argued that some of the risks associated with online shopping are inherent.

The term perceived risk will be conceived herein as an umbrella for a set of eight more specific constructs. These dimensions are perceived financial risk, perceived performance risk, perceived time-loss risk, perceived social risk, perceived psychological risk, perceived physical risk, perceived source risk, and perceived privacy risk. In the following section, each of these eight types of perceived online shopping risk is defined from the perspective of the online shopping situation.

Perceived Financial Risk

Perceived financial risk is defined as concern over any financial loss that might be incurred because of online shopping. The chances of potential financial loss concern the potential expenses of returning the product or the likelihood of any additional hidden cost such as shipping and handling occurring. Further, this type of risk may include any financial loss the prospective online shopper might sustain because of the lack of protection of his or her credit card number or other important financial records. Also, this risk may involve difficulty in getting money back.

Perceived Performance Risk

Perceived performance risk is defined as concern over the functionality of the communication channel (Internet). That is, uncertainty as to if the Internet might not perform as desired and thus not deliver the benefits promised (Mitchell 1999). This risk includes the difficulty of ascertaining, from Web pictures, the characteristics of the products, leading to a concern that the product delivered may not be exactly as it appeared when displayed on the Web site.

Perceived Time-loss Risk

This risk involves the amount of time required to receive the product. Further, the likelihood of such risk is related to the time and effort lost in returning or exchanging the product. Also this risk pertains to any technological problems such as a slow Web site server. And, this risk may involve any technological difficulty encountered in browsing through the Web site. All time lost such as travel time and waiting time can be included in this type of risk.

Perceived Social Risk

Perceived social risk involves the likelihood that online shopping will affect the way others think of the online prospective shopper.

Perceived physical Risk

Perceived physical risk refers to chances of any physical injury because of online shopping.

Perceived Psychological Risk

Perceived psychological risk reflects concern about the psychological discomfort and tension that may arise because of online shopping.

Perceived Source Risk

Perceived source risk reflects concern over whether or not the prospective shopper can trust the online vendors and feel comfortable in doing business with them. Source credibility involves the set of perceptions that receivers of communication hold toward a source. This credibility is related to believability, trustworthiness, and expertise.

Perceived Privacy Risk

Perceived information risk refers to concern over the loss of sensitive and proprietary information.

OVERVIEW OF SCALE DEVELOPMENT AND QUESTIONNAIRE DESIGN

The first step in any scale development is to use the definition to generate a number of items designed to capture the conceptual and logical true variance present in the construct (Churchill 1979; DeVellis 1991; Spector 1992). As stated earlier, we define perceived risk as the expectations of any loss or any negative consequences as a result of online shopping. A separate multi-item scale was developed to assess each of the seven dimensions of perceived risk. Fifty-one items representing various dimensions of perceived risk, four items representing familiarity and knowledge about the Internet, and four demographic items, were generated to form the initial item pool for the scale. These items were chosen to cover various aspects of each domain. Items had to focus on a single dimension, not bridge two or more dimensions, a feature important for construct validity. To construct a pool of items for measuring each of the variables under study, focus group interviews were organized as DeVellis (1991) suggests. Consumers were asked to identify their concerns about online shopping. Some items were adapted from earlier studies in which perceived risk is measured (Bhatnagar, Misra and Rao 2000; Grazioli and Jarvenpaa 2000; Kim and Lennon 2000; Kwon, Saae and Arzeni 1991; Stone and Gronhaug 1993). Overall risk was measured with a scale based on research by Stone and Gronhaug (1993). Intention to shop online items were taken directly from Salisbury et al. (Salisbury, Pearson, Pearson and Miller 2001). Although some of the items were taken from previous measures, they were adapted for the purposes of this study. The questionnaire also included demographic information such as gender, age, academic year in program, and race. A seven-point, Likert-type response format was used. The 65 items were administered to 250 undergraduate students (with an average age of 21 years) in a number of different business classes at a major southeastern university.

CONTENT VALIDITY

Content validity can be defined as the degree to which the domain of the concept one desires to measure is in fact captured by the measures (Nunnelly and Bernstein 1994). The item pools developed to tap each component of the perceived risk dimensions were derived from a thorough literature review. Furthermore, five experts were asked to rate the appropriateness and representativeness of the items included in the various domains of perceived risk. These experts consisted of a management professor who conducts research regarding the security of online shopping, a marketing professor, one doctoral student in management and information systems, and one doctorate candidate in marketing. Some changes were made and the items were then subjected to initial testing.

SCALE PURIFICATION AND DIMENSIONALITY

Having generated data using the pools of items described earlier, the next task was to determine whether any items needed to be eliminated from the scales; items that correlate negatively with one another (after reversing responses to the negatively worded item) or items that did not correlate strongly with the sum of the re-

maining items were removed. Other desirable attributes for an item include a high variance, and a mean that is close to the center of its range (DeVellis 1991). Following the identification of "problem" items, the reliability of each scale was examined using coefficient alpha (Nunnelly and Bernstein 1994). To construct a representative yet more manageable scale, the purified items were further reduced through the selection of five items per dimension exhibiting consistent performance on the criteria listed above and covering the domain represented by each dimension. Table 1 provides the correlation matrix among items in the purified scales.

Exploratory factor analyses were performed on the items for each scale. Principal components analysis with Varimax rotation was undertaken for the nine dimensions of perceived risk using SPSS. The different dimensions of scales were analyzed, and items not satisfying the following criteria were deleted: (1) dominant loadings greater than .40 and (2) cross-loadings less than .25. Criteria for accepting factors relied on the latent root criterion, which specifies an eignevalue greater than 1, to determine the number of factors to be extracted. In addition, the factor loadings are generally high, and the lowest loading is equal to .481. Table 2 shows the results of the principal components analysis of the items measured. Six factors are extracted which accounted for 69.073 percent of the variance in the total variance. The items measuring physiological risk and financial risk each loaded on one factor. Not surprisingly, physiological concerns may in fact reflect reactions to some financial concerns and thus both types of risk tend to be invariant across different risk-provoking situations. Further, the items measuring privacy and source risk loaded on one factor.

Overall, twelve items were retained from the financial risk scale, three from the performance risk scale, three from the time risk scale, two from the social risk scale, one from the psychological risk scale, one from the physical risk scale, eight from the source risk scale (See Appendix 1).

RELIABILITY ASSESSMENT

The internal consistencies of the seven scales exceed the minimum level of 0.70 recommended by Nunnally (1967). Coefficient alphas, minimum item to total correlations, means, and standard deviations for each scale are presented in Table 3. Individual items were assessed and found to be satisfactory using the criterion of item-to-total correlations greater than .50 and squared multiple correlations of more than .30 (DeVellis 1991). The overall risk and intention to shop online were independently analyzed since both scales were borrowed from previous studies. Coefficient alpha for overall risk and intention to shop online were .87 and .971 respectively.

Unidimensionality Assessment/ Construct Validity

Churchill (1979) suggests that the next step in scale purification is to examine the dimensionality of the items. Gerbing and Anderson (1988) describe the use of confirmatory factor analysis to assess unidimensionality. Whereas exploratory factor analysis was used in the purification stage to evaluate and modify the scales, confirmatory factor analysis was used to assess the modified scales and test the proposed seven- factor model. For this analysis, each measure was specified as unidimensional and with appropriate items loading only on its respective factor. The covariance matrix from the student sample was used as input for the CFA. The theoretical model fit the data well (as shown in Table 3). Although the chi-square statistic was significant, the other fit statistics supported the structural model. Equally important is the assessment of the unidimensionality. Unidimensionality would be indicated if all the items load significantly on the single factor. Such evidence was obtained for seven factors. We performed a confirmatory factor analysis using LISREL 8.3 (Joreskog and Sorbom 1999). The results demonstrated that the each three items formed a unidimensional scale with all items loading significantly on the corresponding single latent construct. This fit assessment for this model is shown in Table 4.

TABLE 1
Correlations Among the Items of the Different Perceived Risk Dimensions

	V1	V9	V11	V16	V18	V19	V25	V26	V27	V29	V30	V31	V34	V35	V36	V37	V42	V43	V44
V1	1.000																		
V9	.688	1.000																	
V11	.423	.467	1.000																
V16	.223	.191	.247	1.000															
V18	.186	.117	.158	.499	1.000														
V19	.292	.289	.356	.416	.513	1.000													
V25	.140	.208	.115	.183	.297	.308	1.000												
V26	.191	.187	.220	.187	.177	.306	.583	1.000											
V27	.171	.226	.210	.175	.209	.252	.548	.640	1.000										
V29	-.026	-.005	-.033	-.079	-.074	-.042	.127	.026	.153	1.000									
V30	-.120	-.074	-.075	-.102	-.069	-.079	.050	-.047	.065	.783	1.000								
V31	-.080	-.011	-.034	-.163	-.055	-.075	.100	-.019	.060	.611	.750	1.000							
V34	.390	.522	.226	.128	.178	.242	.299	.235	.303	.243	.190	.216	1.000						
V35	.375	.446	.282	.047	.101	.187	.275	.207	.251	.255	.240	.236	.767	1.000					
V36	.219	.275	.147	-.017	-.017	.090	.289	.163	.221	.219	.216	.253	.558	.646	1.000				
V37	.182	.169	.114	-.005	-.042	.007	.044	.097	.078	.162	.189	.184	.324	.295	.305	1.000			
V42	.231	.256	.288	.265	.312	.348	.254	.146	.208	-.027	-.029	-.015	.212	.166	.134	.061	1.000		
V43	.182	.132	.208	.221	.317	.284	.199	.143	.179	-.013	-.059	-.070	.189	.148	.079	.040	.827	1.000	
V44	.308	.236	.259	.266	.365	.348	.189	.180	.129	-.085	-.169	-.105	.196	.122	.031	-.014	.673	.719	1.000

TABLE 2
Varimax-rotated Matrix of Perceived Risk Items

	Components							Components						
	Financial	**Time**	**Social**	**Source**	**Performance**	**Physical**			**Financial**	**Time**	**Social**	**Source**	**Performance**	**Physical**
VAR1	.701							**VAR30**			.927			
VAR9	.792							**VAR31**			.844			
VAR11	.481							**VAR34**	.713					
VAR16					.759			**VAR35**	.753					
VAR18					.724			**VAR36**	.586					
VAR19					.677			**VAR37**						.854
VAR24		.624						**VAR38**						.721
VAR25		.817						**VAR39**						.796
VAR26		.830						**VAR42**				.881		
VAR27		.763						**VAR43**				.929		
VAR29			.859					**VAR44**				.813		

TABLE 3
Reliability and Descriptive Statistics

	Coefficient Alpha	Minimum Item-to-Total Correlation	Mean	SD
Financial Risk	.77	.48	13.8	3.67
Performance Risk	.73	.53	16.01	2.83
Time Risk	.81	.62	12.81	3.27
Social	.88	.72	8.22	3.77
Psychology Risk	.85	.64	9.14	3.93
Physical Risk	.77	.54	8.01	3.75
Source Risk	.89	.73	14.95	3.5
Overall Risk	.87	.68	9.85	4.15
Intention to Shop	.97	.93	16.02	4.27

TABLE 4
Model Fit Indices

Statistic	Recommended value	Obtained Value
c2		232.64
Degrees of Freedom		168
c2 Significance	*P* =>0.05	0.00
c2 / degrees of freedom (Wheaton et al. 1997)	< 5.0	**1.38**
Standardized RMR (Hu and Bentler, 1999)	<.08	**.05**
RMSEA (Hu and Bentler, 1999)	<.06	**.04**
Significance RMSEA	*P*=>.05	**.90**
GFI (Hu and Bentler, 1999)	>0.95	.91
AGFI (Joreskog and Sorbom, 1988)	>0.80	**.88**
CFI (Bentler, 1990)	>0.90	**.97**
IFI (Bollen, 1989)	>0.90	**.97**
RFI (Bollen, 1989)	>0.90	.88

LIMITATIONS

This study has some limitations that deserve comment. One limitation of the present study was the cross-sectional data collection. Longitudinal or experimental research is needed to provide a more rigorous test of the validity of such scales. Despite this limitation, we believe the study makes a meaningful contribution to the literature because it is one of the few empirical attempts to validate a scale to measure perceived risk in online shopping. A second limitation of the study is its use of one sample for purifying and validating the scale. The assessment of reliability and validity should be done on a new sample to avoid capitalizing on chance. A third limitation of the study is that important mediating variables may have been omitted. One potential mediating construct that was included in the structural model is the degree of familiarity and/or knowledge about the Internet.

FUTURE RESEARCH

Future research analysis should include re-testing this scale, using a non-student sample. Further applications of the scale will provide researchers the opportunity to test consumers' acceptance or aversion to risk in online shopping, specifically for specific types of online risk. By developing and using this scale in conjunction with standardized risk acceptance/aversion scales, consumers could be profiles, based upon their risk-attitude behavior, and thus marketers can address their specific needs and demands to facilitate online shopping adoption.

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APPENDIX
Texts of Items
Measuring Perceived Risk

Perceived Financial Risk

- I am concerned that my financial records might not be adequately protected if I
- shop online (Var1).
- It is not safe to give my credit card number when I order online (Var9)
- I am concerned about the ultimate price of the on-line product because there might be hidden costs (Var11).

Perceived Performance Risk

- It is difficult to ascertain the characteristics of the products such as quality, size, color, and style by just looking at pictures on the Web (Var16).
- It is difficult to feel, try or/and experience the product prior to purchase during online shopping (Var18).
- I am concerned that the product delivered may not be exactly as it appeared when displayed on the computer screen (Var19).

Perceived Time-Loss Risk

- I would have to spend much time if I want to return online merchandise (Var25).

- I am afraid that products purchased from online vendors will not be delivered on time (Var26).
- I am concerned for the time lost between ordering and receiving products bought over the Web (Var27).

Perceived Social Risk

- If I bought a product online, I think my friends would hold me in higher esteem (Var29).
- If I bought a product online, I think my friends would think I am cool (Var30).
- If I buy products online some friends would think I am trying to show off (Var31).

Perceived Psychological Risk

- The thought of online shopping makes me feel uncomfortable (Var34).
- The thought of online shopping causes me to experience unnecessary tension (Var35).
- Online shopping will lead to too much social isolation (Var36).

Perceived Physical Risk

- One concern I have about online shopping is that I could experience eyestrain because of frequent exposure to computer screen during online shopping (Var37).
- I am concerned about viruses infecting my computer while I shop online (Var38).
- I am concerned about getting carpal tunnel syndrome while shopping on line (Var39).

Perceived Source Risk

- It is difficult to ascertain the reliability and expertise of some online companies (Var42).
- It is difficult to ascertain the reputation of some online companies (Var43).
- I am concerned about the trustworthiness and believability of some online companies (Var44).