

Full Length Research Paper

Risk perception and adoption of technology: An empirical study of personal computer use for Pakistani managers

Muhammad Sajjad¹ Asad Afzal Humayoun² and Ziaullah Khan³

¹Department of Business Administration, Iqra National University, Pakistan.

²Department of Management Sciences, Foundation University, Islamabad, Pakistan.

³Networks/Systems NWFP, Directorate of Information Technology, Peshawar, Pakistan.

Accepted 14 July, 2017

Risk associated with use of information technology (IT) may adversely affect the performance of organizational members. In the past, a number of researchers had applied technology acceptance model (TAM) to measure the use of IT, but overlooked the use of personal computers under security threats. The current study presented a modified model of TAM with an additional construct of Perceived Risk (PR). Under the modified model, PR is taken as a direct determinant of attitude toward using computers. A survey of 431 Pakistani managers was conducted through validating questionnaires. SPSS was used for data measurement and regression analysis was done to measure the relationship among the observed constructs. It was found that modified model of TAM works well in the socio-cultural environment of Pakistan. PR was found to have a significant relationship with attitude towards using computer and it was concluded that risk factor is reduced when the use of computers is enhanced.

Key words: Risk perception, perceived risk, adoption of information technology, technology acceptance model, personal computer use, Pakistani managers, technology adoption in Pakistan.

INTRODUCTION

Risk has long been associated to organizational members whenever new technology is introduced in the organization. It may adversely affect the performance of organization whenever management considered new technology as a threat. Even if managers don't think new technology as a threat for them, there are many risks associated with their use unknowingly. Especially, the risk factor is more critical, when these managers make decisions by using personal computers. These risks may be physical or psychological and bring negative consequences on technology adoption process. In a survey of 404 support personnel, Alexander (1994) found that most users had experienced a vision and muscular skeletal problems when they had used computer machines for 3

to 6 h in a day. Later, Zandvliet and Straker (2001) found important links of physical and psychological environments when associated with use of information technologies.

The present study applied the Technology Acceptance Model (TAM) to measure the behavior of Pakistani managers under risk perception. Over the last years, a number of researchers had applied the TAM to examine the usage pattern of information technology (Koufaris 2002; Luo and Strong, 2000; Moon and Kim, 2001; Lallmahmood, 2007; Walczuch et al., 2007; Teo and Schaik, 2009). According to TAM, perceived usefulness and ease of use are key determinants of individuals' adoption of technology (Davis et al. 1989). However, both perceived usefulness and ease of use may not accurately reflect the inspiration of managers for personal computers use under risk perception. In such a perspective, perceived risk is generally assumed to be overlooked by researchers, but it is absolutely an important factor.

*Corresponding author. E-mail: geosajjad@gmail.com. Tel: +92-345-5241230.

Objectives of the study

The aims of the study are as follows:

- 1) To examine the technology adoption process for personal computer use.
- 2) To check the validity of technology adoption model in Pakistani environment.
- 3) To measure the effect of risk factor for Pakistani managers on technology adoption process

Statement of the problem

The study focuses on the risk perception for adoption of technology raising the following questions:

- Does technology acceptance model work well in the Pakistani environment?
Which factors have contributed more in the technology adoption process?
What is the effect of risk on the technology adoption process for Pakistani managers?

Review of literature

The notion of risk perception has drawn substantial interest from scholars of various fields due to its important consequence on the use of personal computers. TAM has been considered an excellent model in understanding individual's perception on the use of the particular technology. In spite of this, when individuals accept technology under security threats, the perceived risk (PR) is generally unnoticed by past TAM studies.

The concept of PR was originally introduced by Bauer in 1967 as a psychological and subjective construct associated with brand loyalty and information seeking behavior. Holton (2004) termed risk as a condition of individuals that are self aware. The concept of PR can be defined 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." (Hassan et al. 2006).

In literature, the effects of PR are diverse and it is hard to understand as several factors influence it. Some models recommended that risk perception could affect only a small fraction of IT while others have been satisfied due to its statistical significance. Some presented significant results by using averages which are quite ambiguous to the explanatory power of the model (Sjoberg 2000).

Previous researches indicated that risk perception was one of the important ingredients of the use of computers, for example, Dhontu and Garcia (1999) found significant differences between computer users and non users while observing their behavior about internet shopping. Lima et al. (2005) explored the concept 'risk perception' at a

societal level and suggested that different patterns of risk perceptions were important for the evaluation and prevalence of technological growth. They concluded that the countries with a faster growth rate of technology were vulnerable to higher levels of risk while countries with slower rates of diffusion are associated with risk normalization.

Alam et al. (2009) studied the behaviors of corporate customers about internet banking and found that risk was an important factor among the six observed factors which significantly affects the process of technology adoption. They also concluded that technology adoption for internet banking is a complicated process and most business people thought that it was not secure for them. In a conceptual model for e-government for Zambia, Bwalya (2009) considered perceived risk as an important factor under user characteristics which may affect technology adoption process.

Tanakinjal et al. (2010) found a direct significant effect of perceived risk on intention to decision for mobile phone users. Some previous studies have considered PR as a multi dimensional construct and stated that PR increased with ambiguity or to the extent of the associated negative consequences (Williams et al. 2002; Gerber and Neeley, 2005). In fact, PR consisted of numerous types of risk including financial risk, physical risk, functional risk, social risk and time- loss risk, opportunity cost risk and information risk. Azmi et al (2010) also highlighted the importance of different types of risks associated with adoption of technology through a conceptual framework. Table 1 summarized some conceptual definitions of different kinds of risk.

From literature, risk is generally believed to have multidimensional construct as shown in Table 1. On the basis of literature, one can hypothesize that PR will positively correlate to attitude toward using the computer.

Hypothesis: Perceived Risk of the computer is positively correlated to attitude toward using the computer (Figure 1).

Perceived Risk is taken as direct determinant of Attitude toward using computer as in the original model of Technology Acceptance Model (TAM), Perceived Usefulness and Perceived Ease of Use are taken as direct determinant of Attitude toward using. The modified model of TAM with an additional construct of PR is shown in Figure 2.

METHODOLOGY

As the model was being tested for the first time in Pakistani environment, a pretest was carried out prior to main study. The purpose of pre-test was to measure the validity of model constructs in the indigenous setup.

Individuals working in managerial positions from both public and private sectors had been included in the study. From Public sector, the respondents included were working on grade 18 or higher while from private sector the respondents included were of equivalent status or one step higher from the first lower managerial position.

Table 1. Categorization of risk perception.

Categories	Definition
Physical risk	Physical risk involves the potential threat to an individual's safety, physical health and wellbeing
Functional risk	Functional risk represents the probability that a product might not perform as expected
Social risk	Social risk is concerned with an individual's ego and the effect that a purchase will have on the opinions of reference groups
Time-loss risk	Time-loss risk refers to the possibility that a purchase will take too long or waste too much time
Financial risk	Financial risk refers to the possibility that the product will not be worth the financial price and would have been available cheaper elsewhere
Opportunity cost risk	Opportunity cost risk refers to possibility that the "the best alternative is not chosen" will lose when a choice is made
Information risk	Information risk refers to the possibility that an individual is operating in an environment of asymmetric information

Source: (Lu et al. 2006; Azmi et al, 2010).

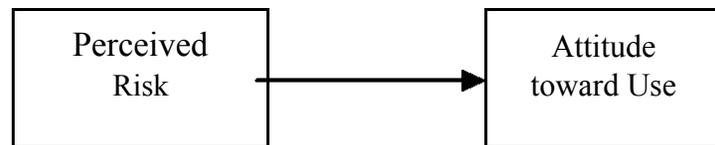


Figure 1. Graphical presentation of PR and attitude (proposed).

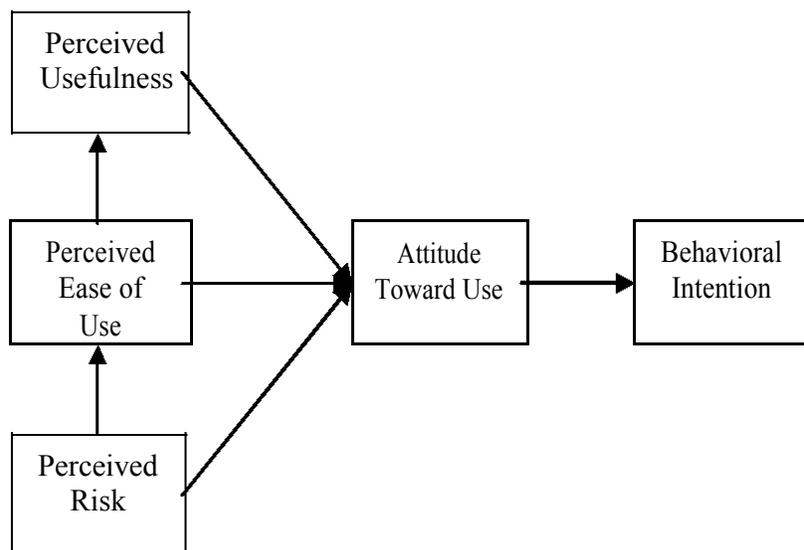


Figure 2. Modified model of TAM with additional construct of PR (proposed).

Table 2. Reliability analyses.

Construct	Composite reliability	AVE	Cronbach's alpha
PUv	0.864390	0.519783	0.806595
PEOUv	0.912543	0.639348	0.869146
Attv	0.689920	0.400262	0.787229
PRv	0.930368	0.770125	0.899311
Blv	0.764344	0.428690	0.828748

Source: Field data.

managerial position. The study focused the behaviors of managers regarding risk perception and use of computers.

An empirical survey method was used while using questionnaire to validate the modified TAM model. The questionnaire was distributed to managers to refine the instrument and to identify important indicators of technology acceptance. During Pretest, core constructs of TAM model (Perceived Usefulness, Perceived Ease of Use, Attitude toward Using and Behavioral Intention) was measured. One additional Construct of Perceived Risk was also included as a direct determinant of Attitude toward using computer.

Due to cultural differences of indigenous environment of Pakistan, the items of the questionnaire were discussed with six well known researchers for thoroughness and clarity of items. The discussion improved the content and face validity and on the recommendations of these experts, some items were rephrased in the construct of attitude toward using computer and perceived risk. Slight changes of vocabulary were also made in the construct of Perceived Usefulness, Perceived Ease of Use and in Behavioral Intention. After these changes, one hundred and fifty questionnaires were distributed to managers using purposive sampling method.

It was found that access to managers tend to be a difficult task due to their busy time schedules so the questionnaires were got filled through acquaintances who acted as a facilitator between interviewee and researcher. From 150 questionnaires, 86 usable questionnaires were received having a response rate of 57%.

Data analysis and model testing was conducted using Statistical Package for Social Sciences (SPSS) Version 12.0. First of all reliability analysis was done using Cronbach's alpha technique and then regression analysis was applied to test the model. There were 14 females and 72 males in the sample of pretest. The average ages of respondents were 40 years with an average experience of using computers were over five years.

The model was also examined for convergent and discriminant validity. Convergent validity was evaluated by reliability of items, from composite reliability of constructs and average variance extracted (AVE). Table 2 shows the composite reliability, average variance extracted and Cronbach's alpha of the constructs used in the study.

Table 3 shows the power of the structural model. The explanatory power of a structural model could be examined by the R square values (variance accounted for) in the dependent variable. Table 3 shows that 43% of the variance accounted for Behavioral Intention (BI) while 51% was explained in attitude toward using computers.

Discriminant validity was measured through factor loadings and cross loadings. Each element is considered valid if its loading is higher within itself as compared to other items. Table 4 shows the loadings of each item.

Main study

No problem was found based on the feedback from pilot test except

Table 3. Variance explained.

Dependent variable	R square
Attv	0.517200
Blv	0.434500

Source: Field data.

in the construct of PR. So, a little modification was done in the construct of PR as respondents were facing difficulties due to language barrier. 1200 questionnaires were distributed to manager using purposive sampling method. Out of which received and usable questionnaires were 431 and were included in the study with a response rate of 36%. The sampling method is consistent with previous researches such as Pijpers and Montfort (2006) and Mostafa (2006). 36% response rate provided sufficient statistical power as compared to previous researched like Pijpers and Montfort (2006) which was 27.7% and in comparison of Mostafa (2006) which was 40%. SPSS 12.0 was used to measure the structural model of the study. Data was analyzed in two stages according to Bhattacharjee and Sanford (2006). In the first phase the reliabilities of the constructs were tested and in the second phase, the relationships among the constructs were measured as hypothesized.

English was used as a medium of exchange during data collection phase which did not appear to be a problem for the participants as all respondents are literate and enjoying good positions as managers in their respective organizations. Participation in data collection phase was voluntary and confidential.

ANALYSES

PU, PEOU, PR, and ATTITUDE

Table 5 shows that there is a strong positive relationship among the main constructs of model. The value of R = 0.636 which is higher than 0.5 shows that there is a strong positive relationship between the independent variables (PU, PEOU, PR) and dependent variable (Attitude).

Table 6 shows that the predictors PU, PEOU and PR have significant relationship with attitude toward using computers. 0.000 of p value shows that there is significant relationship among the observed variables. So, it can be said that independent variables (PU, PEOU, and PR) significantly affect the dependent variable that is attitude toward using the computers.

Table 4. Factor loadings and cross-Loadings.

Scale Items	PU	PEOU	Att.	PR	BI
PU1	0.7019	0.3210	0.2454	0.2882	0.5878
PU2	0.5581	0.1278	0.2399	0.3470	0.3244
PU3	0.8162	0.2057	0.4643	0.4316	0.4373
PU4	0.8528	0.3981	0.4506	0.3924	0.5549
PU5	0.7010	0.5210	0.3385	0.4492	0.4183
PU6	0.6556	0.3093	0.4424	0.3670	0.2687
PEOU1	0.2085	0.8036	0.3053	0.2846	0.4425
PEOU2	0.3451	0.5663	0.2800	0.4182	0.4446
PEOU3	0.4166	0.8896	0.5086	0.5637	0.6413
PEOU4	0.2315	0.8360	0.2930	0.3002	0.4937
PEOU5	0.4906	0.7655	0.4808	0.5448	0.5000
PEOU6	0.3309	0.8907	0.4348	0.4980	0.4653
Att1	0.1546	0.3135	0.3020	0.1432	0.1835
Att2	0.1772	0.2792	0.3380	0.1957	0.1856
Att3	0.4307	0.4506	0.8553	0.5955	0.4365
Att4	0.4214	0.4254	0.8148	0.5433	0.4373
PR1	0.4872	0.5108	0.5083	0.8840	0.3944
PR2	0.4640	0.5336	0.6217	0.8856	0.4392
PR3	0.5763	0.5669	0.7477	0.9340	0.6174
PR4	0.2490	0.3573	0.4875	0.8015	0.3449
BI1	0.4847	0.5376	0.4113	0.3132	0.7905
BI2	0.6053	0.6364	0.5137	0.5522	0.9872
BI3	0.2741	0.4805	0.2835	0.2838	0.4799
BI4	0.2307	0.4035	0.2960	0.1556	0.4410
BI5	0.1803	0.3112	0.2322	0.2058	0.3452

Source: Field data.

Table 5. Model summary (PU, PEOU, PR and Attitude).

Model	R	R ²	Adjusted R ²	Std. error of the estimate
1	.636(a)	.405	.398	.37510

Predictors: (Constant), PR, PEOU, PU ; Dependent variable: Att. Source: Field Data

Conclusion

The following hypothesis was developed to measure the influence of PR on attitude toward using computer.

Hypothesis: Perceived risk of the computer is positively correlated to attitude toward using the computer.

The above hypothesis is supported at significance level of 0.000 through the results (Table 6) and it is safely concluded that PR is positively correlated to attitude toward using the computer. These results are consistent with the previous findings of Williams et al. (2003), Horst

et al. (2007) and Haque et al. (2009) who found a significant relationship between risk perception and attitude toward using computer. Lu et al. (2006) examined a negative and noteworthy relationship of PR with attitude which is also consistent with our finding as shown in Table 7. It can be further concluded that the individuals who are more familiar with the use of computers, considered computers less risky for them. The results are also consistent with the findings of previous studies such as Zhou et al. (2007), Chu and Li (2008), Siegrist (2008) and Belkhamaza and Wafa (2009). So, it can be safely said that by giving more insights to organizational members about technology could help them in reducing their risk

Table 6. ANOVA (PU, PEOU, PR and attitude).

Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	40.721	5	8.144	57.883	.000(a)
	Residual	59.798	425	.141		
	Total	100.519	430			

Predictors: (Constant), PR, PEOU, PU. Dependent variable: Att. Source: Field data

Table 7. Coefficients (PU, PEOU, PE, PR and attitude).

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Std. error	Beta		
1	(Constant)	1.024	.200		5.115	.000
	PU	.319	.042	.349	7.601	.000
	PEOU	.096	.043	.107	2.248	.025
	PR	-.113	.040	-.111	-2.810	.000

Dependent variable: Att

Source: Field data.

perception.

REFERENCES

- Alam SS, Musa R, Hassan F (2009). Corporate Customers' Adoption of Internet Banking: Case of Klang Valley Business Firm in Malaysia. *Inter. J. Bus. Manage.*, 4(4): 13-21.
- Alexander MA (1994). Physical Problems Associated with Computer Use and Implemented Ergonomic Measures. *Delta Pi Epsilon. J.*, 36 (4): 89-202.
- Azmi AA, Kamarulzaman Y (2010). Adoption of tex e-filing: A conceptual paper. *Afr. J. Bus. Manage.*, 4(5): 599-603.
- Belkhamaza Z, Wafa SA. (2009). The Effect of Perceived Risk on the Intention to Use E-commerce: The Case of Algeria. *J. Inter. Banking. Commerce.*, 14(1): 1-10.
- Bhattacharjee A, Sanford. C (2006). Influence processes for information technology acceptance: an elaboration likelihood model. *MIS Quarterly.*, 30(4): 805-825.
- Bwalya KJ (2009). Factors affecting adoption of e-government in Zambia. *Electronic. J. Inf. Systems. Dev Countries.*, 38 (4): 1-13.
- Chu K, Li C (2008). A study of the effect of risk-reduction strategies on purchase intentions in online shopping. *Int. J. Electronic. Bus. Manage.*, 6(4): 213-226.
- Davis FD, Bagozzi RP, Warshaw PR (1989). User acceptance of computer technology: a comparison of two theoretical models. *Manage. Sci.*, 35: 982-1003.
- Donthu N, Garcia A (1999). The Internet Shopper. *J. Advertising. Res.*, 39(3): 52-58.
- Gerber BJ, Neeley GW (2005). Perceived risk and citizen preferences for governmental management of routine hazards. *Policy Stud. J.*, 33(3): 395-418.
- Haque A, Ismail ZAH, Daraz AH (2009). Issues of E-Banking Transactions: An empirical investigation on Malaysian customers perception. *J. Appl. Sci.*, 9(10): 1870-1879.
- Hassan AM, Kunz MB, Pearson AW, Mohamed FA. (2006). Conceptualization and measurement of perceived risk in online shopping. *Mark. Manage. J.*, 16(1): 138-147.
- Holton GA (2004). Defining Risk. *Fin. Anal. J.*, 60(6): 19-25.
- Horst M, Kuttschreuter M, Gutteling JM (2007). Perceived usefulness, personal experiences, risk perception and trust as determinants of adoption of e-government services in The Netherlands. *Computers in Human Behav.*, 23: 1838-1852.
- Koufaris M (2002). Applying the Technology Acceptance Model and Flow Theory to online consumer behavior. *Inf. Syst. Res.*, 13(2): 205-23.
- Lallmahamood M (2007). An examination of individual's perceived security and privacy of the internet in Malaysia and the influence of this on their intention to use e-commerce: Using an extension of the technology acceptance model. *J. Int., Banking Commerce*, 12(3): 1-26.
- Lima ML, Barnett J, Vala J (2005). Risk Perception and Technological Development at a Societal Level. *Risk Analysis*, 25 (5): 1229-1239.
- Lu H, Hsu C, Hsu H (2006). An empirical study of the effect of perceived risk upon intention to use online applications. *Inf. Manage. Comput. Security.*, 13(2): 106-120.
- Luo W, Strong D (2000). Perceived critical mass effect on groupware acceptance. *European. J. Inf. Syst.*, 9(2): 91-103.
- Moon J, Kim Y (2001). Extending the TAM for a world-wide-web context. *Inf. Manage.*, 38(4): 217-230.
- Mostafa MM (2006). An empirical investigation of Egyptian consumer's usage patterns and perceptions of the internet. *Int. J. Manag.*, 23(2): 243-260.
- Pijpers GM, Montfort KV (2006). An investigation of factors that influence senior executives to accept innovations in information technology. *Int. J. Manag.*, 23: 11-23.
- Siegrist M (2008). Factors influencing public acceptance of innovative food technologies and products. *Trends. Food. Sci. Technol.*, 19 (1): 603-608.
- Sjoberg L (2000). Factors in Risk Perception. *Risk Analysis*, 20(1): 1-11.
- Tanakinjal GH, Deans KR, Gray BJ (2010). Third Screen Communication and the Adoption of Mobile Marketing: A Malaysia Perspective. *Inter. J. Mark. Stud.*, 2(1): 36-47.
- Teo T, Schaik PV (2009). Understanding Technology Acceptance in Pre-Service Teachers: A Structural-Equation Modeling Approach. *Asia-Pacific. Educ. Res.*, 18(1): 47-66.
- Walczuch R, Lemmink J, Streukens S (2007). The effect of service employees' technology readiness on technology acceptance. *Inf. Manage.*, 44(1): 206-215.
- Williams S, Zaiuba M, Jackson R (2003). Affective influences on Risk Perceptions and Risk Intention. *J. Manag. Psychol.*, 18(2): 126-137.
- Zandvliet D, Straker L (2001). Physical and psychosocial aspects of the learning environment in information technology rich classrooms. *Ergonomics*, 2(1): 1-11.
- Zhou L, Zai L, Zhang D (2007). Online shopping acceptance model — A critical survey of consumer factors in online shopping. *J. Electronic. Commerce. Res.*, 8(1): 41-62.