2008

There All Along? A Preliminary Meta-Analysis of the Moderating Gender Effects in Technology Acceptance Research

Wenying Nan Sun
University of Kansas, nansun@ku.edu

Miguel I. Aguirre-Urreta
University of Kansas, mau@ku.edu

Michael E. Ellis
University of Kansas, mellis@uca.edu

George Marakas
University of Kansas, gmarakas@ku.edu

There All Along? A Preliminary Meta-Analysis of the Moderating Gender Effects in Technology Acceptance Research

Wenying Nan Sun
University of Kansas
nansun@ku.edu

Miguel I. Aguirre-Urreta
University of Kansas
mau@ku.edu

Michael E. Ellis
University of Kansas
meellis@ku.edu

George M. Marakas
University of Kansas
gmarakas@ku.edu

ABSTRACT

Technology acceptance is one of the most extensive streams of research in the information systems literature. Building on previous work, it has recently been proposed that the gender of information system users moderates the relationships between intention to use a technology and its most important determinants, perceived usefulness and perceived ease of use. A better understanding of the magnitude of this effect and its implications seems important in the development of practical applications of the theory, such as those related to training and motivational interventions. This research reports on a preliminary meta-analysis of extant literature in mainstream journals employing the proportion of men and women in the studies as an indicator of the expected relationships. An explanation of this approach is provided, and preliminary results are discussed.

Keywords

Technology acceptance model, gender effects, meta-analysis.

INTRODUCTION

As organizations innovate with IT and encounter difficulties and even failures in this endeavor, implementation problems challenge researchers to look into the nature and the sources of the "implementation puzzle" (Swanson, 1988). The Technology Acceptance Model (TAM), first introduced by Davis (1989) and Davis, Bagozzi and Warshaw (1989), provides a parsimonious theoretical model for explaining individual adoption of IT innovations. Since its introduction, TAM has generated an explosion of research. According to Lee, Kozar and Larsen (2003), TAM occupied 10 percent of the IS journal space and is in fact considered by many researchers the most researched IS model in the field. The original papers that introduced TAM (Davis, 1989; Davis, Bagozzi and Warshaw, 1989) are some of the most cited papers in IS literature. TAM research has become so prevalent that entire special issues of journals have been published, the April 2007 issue of JAIS providing a recent example. In this *Special Issue on Technology Acceptance Research*, eminent scholars address contributions, limitations, and future research in technology acceptance (Hirschheim, 2007; Schwarz and Chin, 2007; Venkatesh, Davis and Morris, 2007; Silva, 2007; Bagozzi, 2007; Straub and Burton-Jones, 2007; Goodhue, 2007; Benbasat and Barki, 2007; Lucas, Swanson and Zmud, 2007).

Since the introduction of TAM, research of technology acceptance has progressed through many related research streams. One such stream investigates gender as a moderating variable. Although this stream has consistently identified a gender effect, the studies are all relatively recent (Venkatesh and Morris, 2000; Gefen and Straub, 1997; Venkatesh, Morris and Ackerman, 2000; Venkatesh, Morris, Davis and Davis, 2003). In this paper, we seek to gain a better understanding of the gender effect by applying the technique of meta-analysis to study the magnitude and importance of gender effects as reported in the technology acceptance literature.

We believe conducting such a study has three important implications. First, this research will provide a more accurate estimate of the magnitude of the moderating gender effect. Researchers will find this valuable for planning further investigations in this area, specifically in the determination of required sample size. Second, this paper serves as an introduction to the IS field of some of the techniques used in the analysis, specifically the calculation of correlation

coefficients from beta coefficients and the use of composition proportions as a weighting tool in this type of application. Finally, it will shed some light on whether further examination of the gender effect in technology acceptance is worthwhile. To the extent that the effect size is of a practically important magnitude, a better understanding of its underlying determinants could be helpful in the design of training and change management interventions. On the other hand, if the magnitude of a statistically significant moderating gender effect is relatively trivial, then future research efforts into the applicability of technology acceptance research to new environments may be a better use of resources.

The remainder of this paper is structured as follows. Next, a review of relevant technology acceptance literature and past research examining gender effects is presented. Following that, we present an introduction and discussion of the novel methodology employed in this research. Results, discussion and directions for future work follow.

LITERATURE REVIEW

TAM is grounded in models from social psychology, such as the Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1980), and the Theory of Planned Behavior (TPB) (Ajzen, 1991). It represents the antecedents of IT usage through beliefs about two factors: the perceived ease of use (PEOU) and the perceived usefulness (PU). In TAM, behavioral intention (BI) is determined by attitude towards usage and by the effects of PEOU and PU.

Within the broad area of inquiry on how and why individuals adopt new information technologies, there have been several research models explaining individual acceptance of information technology. Venkatesh, et al. (2003) reviewed user acceptance literature and identified eight key competing theoretical models: TRA, TAM, TPB, Motivational Model (MM), Combined TAM and TPB (C-TAM-TPB), Model of PC Utilization (MPCU), and Innovation Diffusion Theory (IDT). They empirically compared the eight models by using data from four organizations, which provided a baseline assessment of the explanatory power of each individual model against which the unified model could be compared. They then formulated a unified model by integrating elements across eight models. In their unified model – the Unified Theory of Acceptance and Use of Technology (UTAUT), the authors considered performance expectancy, effort expectancy, social influence, facilitating conditions and their effects on intention and usage. Performance expectancy is composed of PU, extrinsic motivation, job-fit, relative advantage, and outcome expectations. Effort expectancy consists of PEOU, complexity, and ease of use. Social influence includes subjective norm, social factors, and image. Facilitating conditions include perceived behavioral control (PBC), facilitating conditions, and compatibility. Gender, age, experience, and voluntariness of use are included as moderating variables. Their study results reveal that UTAUT outperforms the eight individual models. Figure 1 is the research model Venkatesh, et al. (2003) developed. It represents the most comprehensive model in technology acceptance literature thus far.

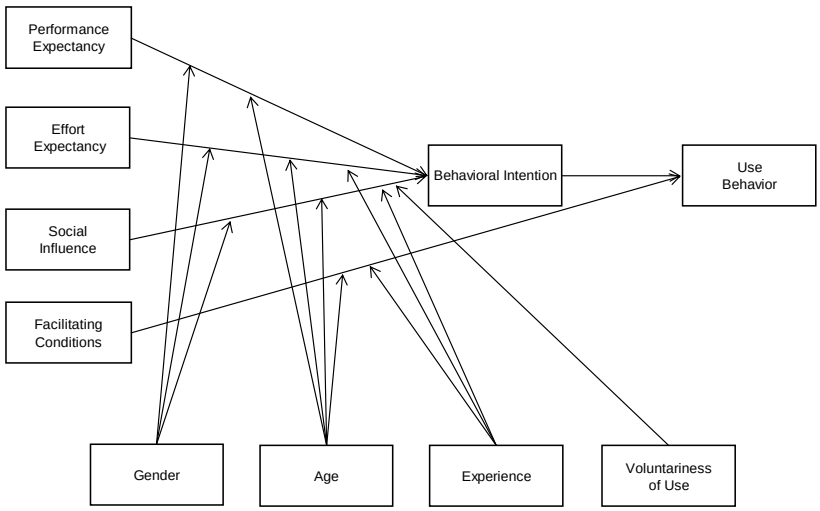

Figure 1. The Unified Theory of Acceptance and Usage of Technology (Venkatesh, Morris, Davis and Davis, 2003)

In regards to the examination of gender effects in technology acceptance, several studies have been conducted. Gefen and Straub (1997) studied 397 knowledge workers using email system. Study findings indicated that women and men differed in their perceptions but not actual use of email. Women perceived a higher social presence and usefulness of email, while men felt more at ease with email, but gender differences did not affect actual use. Venkatesh and Morris (2000) studied 342 workers over a 5-month period who were being introduced to a new software system. Their study found that men's usage decisions were more strongly influenced by perceived usefulness while women were more strongly influenced by perceived ease of use and subjective norm, even though the effect of subjective norm diminished over time. Venkatesh et al. (2000) studied 355 workers being introduced to a new software technology application. The study found clear gender differences in an individual's technology adoption decisions in the work place. Decisions of men were more strongly influenced by their attitude toward the technology while women were more influenced by subjective norm and perceived behavioral control. Venkatesh et al. (2003) used data from several organizations to empirically test the unified model. They found that gender as a moderating variable has a definite effect. For men there is a stronger effect in regards to the influence of performance expectancy on behavioral intention. The effects for women are seen in two relationships. They found a stronger effect in the influence of effort expectancy on behavioral intention, and a stronger effect than for men in the influence of social influence on behavioral intention.

In summary, all of the cited studies identified gender differences. Gefen and Straub (1997) noted that men and women differed in their perception of technology in regards to ease of use and usefulness. Venkatesh and Morris (2000) found that men's usage decision was more influenced by usefulness while women's decision was more influenced by ease of use. Venkatesh et al. (2000) reported that men's decisions were more influenced by attitude while women's decisions were more influenced by subjective norm and perceived behavioral control. Venkatesh et al. (2003)'s test on the unified model revealed that moderating effect of gender differed on three relationships: performance expectancy and intention, effort expectancy and intention, and social influence and intention. Due to the limited time span and the low number of studies, we hope our research will provide a better understanding of this particular subject area through the study of effect size.

METHODOLOGY

Meta-analysis, first used in the statistical sense by Glass (1976), is a statistical technique that combines the results of several studies which address a set of research hypotheses (Glass, 1981; Hwang, 1996). Meta-analyses aim to derive a quantitative measure of the effect size of the relationships under study. The derived effect size is then examined to determine its strength and significance. There are two main types of effect size: standardized mean difference (e.g., Cohen's d or Hedges g) and correlation (e.g., Pearson's r) (Hwang, 1999). Meta-analysis emphasizes the practical importance of the effect size rather than the statistical significance of individual studies.

This research employs the family of meta-analytic techniques outlined by Hedges and Olkin (1985), focused on the correlation coefficient as the main effect size of interest. This review is restricted only to those studies in major IS journals that reported information allowing for the calculation of the proportions of each gender in the study sample, as well as data about the relationship between perceived usefulness and behavioral intention, and perceived ease of use and behavioral intention. These are the relationships where gender effects in technology acceptance have previously been hypothesized.

Whereas correlation coefficients are the main statistic of interest, they are not always available in the extant literature because of the inconsistency between authors and journals in reporting practices. This missing data would normally force us to further restrict our sample to only those studies specifically reporting correlation coefficients between two of the constructs noted above, in addition to gender-relevant information. Fortunately, Peterson and Brown (2005) developed a procedure to recover correlation coefficients from standardized beta estimates with a high degree of accuracy. By conducting a large scale survey of over twenty five years of research published in the premier journals of the behavioral and social sciences that included both correlation coefficients (r) and path coefficients (β) for the same relationships, the authors were able to develop a formula relating these two statistics such that the former could be recovered from knowledge about the latter:

$$r = \beta + 0.05\lambda \quad \text{where } \lambda = 1 \text{ if } \beta > 0 \text{ and } \lambda = 0 \text{ otherwise.}$$

In order to study the potential moderating effects of gender on the main relations in current technology acceptance research, a weighted least squares (WLS) model was fit to the data as first outlined by Hedges and Olkin (1985). In this technique, a potential moderator of interest (independent variable) is fit to the sample of correlations (dependent variable) using a linear model. However, the assumption underlying ordinary least squares (OLS) regression of constant error variances across

observations is violated when employing correlations obtained from studies with different sample sizes (Hedges and Olkin, 1985). To correct for this problem the regression parameters are weighted according to the sampling error variance (S^2_{SE}), calculated as follows (Fisher, 1921), and then using its inverse square root to create the appropriate weights (Steel and Kammeyer-Mueller, 2002):

$$S^2_{SE} = \frac{\left(1 - r^2_{xy}\right)^2}{N-1} \qquad weight = \frac{1}{\sqrt{S^2_{SE}}}$$

The moderating parameter, which plays the role of independent variable in the WLS regression procedure outlined above, is the proportion of men in each of the studies included in the sample. The rationale for this logic is quite straightforward, and the process has already been employed in a number of studies in other fields (e.g., Porter and Haslam, 2005; Sorensen, Pinquart and Duberstein, 2002; Ng, Eby, Sorensen and Feldman, 2005). In the particular case of technology acceptance, to the extent that certain relationships are theorized to be higher for men than they are for women, samples with increasingly higher proportions of men in them should display higher correlation coefficients. Conversely, for those relationships where it is argued women display stronger effects, samples with higher proportions of men in them should report increasingly smaller correlation coefficients. These effects are expected after accounting for the effects of sampling variance as discussed above.

In essence, the procedure attempts to employ the proportion of two arguably heterogeneous groups (in this case men and women) in different samples to gain an understanding of whether these two groups display differential relationships between constructs. Although this procedure is still exploratory (albeit having been used in recently published research), large scale simulation studies of its performance, parameter recovery bias, power, and type I error are under way. In this procedure, the intercept (α) estimates the value of the correlation for the reference group, while the beta coefficient (β) estimates the difference between the correlation coefficient for the reference group and the correlation coefficient for the non-reference group. For this study, we examine the correlations between two of the TAM variables given the proportion of males in the study sample (Pm). The correlation coefficients are estimated using the following:

$$r_{PU,BI} = \alpha + \beta \times P_m + \varepsilon$$
$$r_{PEOU,BI} = \alpha + \beta \times P_m + \varepsilon$$

The first equation is used to estimate the correlation between PU and BI given different proportions of men in the sample population of each of the studies. The second result is the correlation between PEOU and BI at the given male population proportion. In both cases, regression coefficients are estimated using a weighted least squares procedure, with weights as outlined above and the regression error term represented by ε.

Several meta-analysis studies have been conducted on TAM (King and He, 2006; Lee, Kozar and Larsen, 2003; Ma and Liu, 2004; Sabherwal, Jeyaraj and Chowa, 2006). Our meta-analysis differs from the previous ones in two aspects. One is that we focus on gender as the moderating variable. Second, we use the proportion approach of meta-analysis to examine the relationships among multiple variables. Our study includes TAM research published in premier journals such as MISQ, ISR, JMIS, JAIS, Decision Sciences, and Management Science. Quantitative studies which include at least two TAM variables (perceived ease of use, perceived usefulness, attitude, intention, behavior/usage, perceived behavioral control, and subjective norm) were qualified for inclusion. Even though other constructs such as compatibility, complexity, and relative advantage are worthy further investigation, examinations of related literature in premier journals (Karahanna, Straub and Chervany, 1999; Moore and Benbasat, 1991; Plouffe, Hulland and Vandenbosch, 2001; Reich and Benbasat, 1990; Straub, 1994) reveal that gender effect has not been reported in those studies. Since the purpose of this study is to examine gender effect, only studies with constructs that report gender effect are of interest. An exhaustive electronic and manual search resulted in the qualification of 79 papers, of which 22 studies reported gender information. Please see Table 1 for journal and study information.

Prior to beginning the analysis, the authors developed a protocol to ensure consistent coding and subsequent analysis. Three doctoral students participated in the coding task. Follow-up discussions were held to resolve ambiguities and discrepancies.

Journals	# of TAM related papers	# of studies reported gender information
MISQ	30	9
ISR	13	4
JMIS	12	2
JAIS	10	6
Decision Sciences	10	1
Management Science	4	0
Total	79	22

Table 1 – Number of Studies Included per Journal

RESULTS

Rather surprisingly, only a relatively small proportion of the studies sampled, all of which had been published in premier IS outlets, reported enough information about the relationships and moderator of interest to be included in this preliminary report. In particular, twenty one studies were used to assess potential moderating effects in the perceived usefulness – behavioral intention relationship (out of which seven required the recovery of correlation coefficients from standardized betas using the procedure outlined above), and seventeen for the perceived ease of use – behavioral intention relationship (out of which five correlation coefficients were recovered from beta coefficients). Average sample sizes were 322 and 332 respectively. Sample size weighted correlations were 0.48 for the PU-BI constructs, and 0.414 for PEOU-BI. The average proportions of men in the samples were 53.6% and 51.56% in each case.

Neither of the two models estimated resulted in significant effects for the proportion of men in the sample, although this may be a result of the relatively low number of studies included in this study. Ongoing simulation work, however, indicates that even if the power to detect significant effects is low, the procedure is quite accurate in estimating the magnitude of the effects. Even so, these results should be considered speculative until a larger sample of studies can be assembled to better test these effects.

The model involving the PU-BI relationship shows an estimated intercept of 0.631 with a beta of -0.097, whereas the model with the PEOU-BI relationship shows an estimated intercept of 0.468 with a beta of -0.037. The results of the first model are consistent with current conceptualizations of the relationship between PU and BI, where men (the reference group) show a stronger relationship than women. Results from the second model, however, are contrary to our current understanding, in that men also display a stronger relationship than women in the PEOU-BI case, though the difference is noticeably smaller (e.g. -0.0937 vs. -0.037). A summary of findings is presented in Table 2.

	Studies	Average Sample Size	Male Proportion	Weighted Correlation	Intercept	Coefficient	t-statistics	p-value
PU->BI	21	322	53.6%	0.48	0.631	-0.097	-0.29	0.775
PEOU->BI	17	332	51.56%	0.414	0.468	-0.037	-0.09	0.930

Table 2 – Summary of Findings

DISCUSSION

TAM has served as an extensive research model for technology acceptance at the individual level. The original TAM included only five variables: ease of use, usefulness, attitude, behavioral intention, and behavior. Over time, researchers have added other variables such as self-efficacy, subjective norms, social influence, etc. The unified model Venkatesh et al. (2003) proposed combines elements from eight variations of theoretical frameworks in technology acceptance. Their empirical

study demonstrates that the unified model outperforms the eight individual models. Along with many other research streams investigating the different components of the model, a number of studies have examined gender as a moderating variable. All of these previous studies have consistently concluded that there is a gender effect.

While meta-analysis is quite popular in psychology and other behavioral disciplines, it is still an under-used technique in information systems research. Part of the underlying reason is due to the dynamic nature of the discipline, which encourages limited replication and thus limited raw material for comprehensive meta-analyses. Fortunately, technology acceptance has been extensively studied so there is a large empirical base from which input to a meta-analysis could be drawn. Hunter and Schmidt (2005) make a convincing argument for the importance of cumulating results across studies. Given the relatively small sample sizes and effect magnitude present in behavioral research, as well as the important effects that mere sampling variance has on the results of individual studies, quantitatively integrating these is of paramount importance to the accumulation of knowledge.

In this study, we used meta-analytical techniques to integrate the results of multiple studies published in premier journals that reported the gender composition of their samples. We then use the reported gender composition information to calculate the correlation between PEOU and BI, and the correlation between PU and BI. We did not find significant correlations, meaning that based on the sample studies we included, we did not see differences between men and women with regards to perceived usefulness and perceived ease of use. Due to the limited number of studies we were able to include in the analysis, this conclusion is by no means affirmative. A more comprehensive inclusion and examination of studies that report gender information is needed. However, it appears there is preliminary evidence that there is no actual gender effect present. Future research, pending the results of our complete meta-analysis of all of the TAM research, would be best served by using this absence of effect as a construct check rather than as an objective of future investigation.

There are several possible limitations to this study. First, we confined ourselves to research published only in major journals due to the preliminary nature of this investigation. As previously alluded to, the small sample size of this study could lead to low statistical power, allowing effects that are actually present to escape detection. While this is certainly possible, we expect subsequent research to demonstrate that this is not the case. Second, not all of the studies done on TAM or its individual constructs report the gender composition of their subjects. Since our meta-analysis data is therefore incomplete, there is the possibility of the introduction of sample selection bias. An examination of the studies included in this analysis reveals a wide variety of sample demographics and environments. Thus, we believe this second limitation has little impact on our study results. Finally, the Peterson and Brown (2005) technique for calculating correlation coefficients from beta coefficients may have introduced small amounts of error into our model with each calculation. While it has been shown to be very accurate, the technique is not perfect. However, we believe the random nature of any individual calculational errors will eliminate any possible aggregate effect from the use of the method.

FUTURE WORK

We are in the process of conducting a comprehensive meta-analysis of the Technology Acceptance Model. This meta-analysis will integrate all of the relationships, associated variables, and moderating effects found by individual studies of TAM and its constructs. As part of this larger effort, we will re-examine gender effect using the methods introduced here but including all TAM studies that report gender information across all available published sources. A search of ISI Web of Knowledge using the seminal TAM studies (e.g., Davis, 1989; Davis, Bagozzi and Warshaw, 1989; Szajna, 1996; Venkatesh et al, 2003; etc.) yielded in excess of thirteen hundred unique citations for this stream of research, of which more than three hundred are empirical tests of all or part of the original research model. While previous quantitative meta-analyses of TAM have been limited to a relatively small subset of studies, we intend to be as comprehensive as possible in order to provide the most accurate picture of the fundamental relationships involved in this extensive literature.

One of the authors is in the process of validating the meta-analysis approach of using composition proportions as a weighting tool. While this approach, as noted above, has already been employed in a number of studies, a comprehensive examination of its performance and accuracy has not yet been undertaken. This work in progress varies the number of studies included in the meta-analysis, the number of subjects in each study, the strength of the correlation between variables of interest found in each heterogeneous group, and the difference between these correlations, which is the main outcome of interest. By varying all of these conditions, in addition to including no differences between populations, bias of the estimates and standard error, statistical power, and type I error can be better understood. The findings from the validation study will provide insights on the method we will use for future studies.

REFERENCES

1. Ajzen, I. (1991) The Theory of Planned Behavior, *Organizational Behavior and Human Decision Processes* (50:2), 179-211.
2. Ajzen, I., and Fishbein, M. (1980) *Understanding Attitudes and Predicting Social Behavior*. Prentice-Hall, Cliffs, NJ.
3. Bagozzi, R. (2007) The Legacy of the Technology Acceptance Model and a Proposal for a Paradigm Shift, *Journal of the Association for Information Systems* (8:4), 244-254.
4. Benbasat, I. and Barki, H. (2007) *Quo Vadis*, TAM?, *Journal of the Association for Information Systems* (8:4), 211-218.
5. Davis, F. (1989) Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology, *MIS Quarterly* (13:3), 319-340.
6. Davis, F., Bagozzi, R. and Warshaw, P. (1989) User Acceptance of Computer Technology: A Comparison of Two Theoretical Models, *Management Science* (35), 982-1003.
7. Fishbein, M., and Ajzen, I. (1975) *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*. Addison-Wesley, Reading, MA.
8. Fisher, R. (1921) On the 'Probable Error' of a Coefficient of Correlation Deduced from a Small Sample, *Metron* (1), 1-32.
9. Gefen, D. and Straub, D. (1997) Gender Differences in the Perception and Use of E-Mail: An Extension to the Technology Acceptance Model, *MIS Quarterly* (21:4), 389-400.
10. Glass, G.V. (1976) Primary, Secondary, and Meta-analysis of Research, *Educational Researcher* (5:10), 3-8.
11. Glass, G.V. (1981) *Meta-analysis in Social Research*. Sage Publishing, Beverly Hills, CA.
12. Goodhue, D. (2007) Comment on Benbasat and Barki's '*Quo Vadis*, TAM' article, *Journal of the Association for Information Systems* (8:4), 219-222.
13. Hedges, L., and Olkin, I. (1985) *Statistical Methods for Meta-Analysis*, Academic Press Inc., Orlando, FL.
14. Hirschheim, R. (2007) Introduction to the Special issue on 'Quo Vadis TAM – Issues and Reflections on Technology Acceptance Research' , *Journal of the Association for Information Systems* (8:4), 203-205.
15. Hunter, J. and Schmidt, F. (2005) *Methods of Meta-Analysis: Correcting Error and Bias in Research Findings*. Sage Publications Inc., Thousand Oaks, CA.
16. Hwang, M. (1996) The Use of Meta-analysis in MIS research: promises and Problems, *The DATA BASE for Advances in Information Systems* (27:3), 35-48
17. Hwang, M. (1999) The Effect of User Engagement on System Success: A Meta-analytical Integration of Research Findings, *Information & Management* (35), 229-236.
18. Karahanna, E., Straub, D.W., and Chervany, N.L. (1999), Information Technology Adoption across Time: A Cross-sectional Comparison of Pre-adoption and Post-adoption Beliefs, *MIS Quarterly*, 23(2), 183-213.
19. King, W. R. and He, J., (2006) A Meta-Analysis of the Technology Acceptance Model, *Information & Management* (43:6), 740-755.
20. Lee, Y., Kozar, K. and Larsen, K. (2003) The Technology Acceptance Model: Past, Present, and Future, *Communications of the Association for Information Systems* (12), 752-780.
21. Lucas, H., Swanson, B. and Zmud, R. (2007) Implementation, Innovation, and Related Themes Over the Years in Information Systems Research, *Journal of the Association for Information Systems* (8:4), 206-210.
22. Ma, Q. and Liu, L., (2004) The Technology Acceptance Model: A Meta-Analysis of Empirical Findings, *Journal of Organizational and End User Computing* (16:1), 59-72.
23. Moore, G.C. and Benbasat, I. (1991), Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation, *Information Systems Research*, 2(3), 1992-222.
24. Ng, T., Eby, L., Sorensen, K., and Feldman, D. (2005) Predictors of Objective and Subjective Career Success: A Meta-Analysis, *Personnel Psychology* (58), 367-408.
25. Peterson, R., and Brown, S. (2005) On the Use of Beta Coefficients in Meta-Analysis, *Journal of Applied Psychology* (90:1), 175-181.
26. Plouffe, C.R.,Hulland, J.S., and Vandenbosch, M. (2001), Research Report: Richness versus Parsimony in Modeling Technology Adoption Decisions – Understanding Merchant Adoption of a Smart Card-based Payment System, *Information Systems Research*, 12(2), 208-222.
27. Porter, M., and Haslam, N. (2005) Predisplacement and Postdisplacement Factors Associated with Mental Health of Refugees and Internally Displaced Persons: A Meta-Analysis, *Journal of the American Medical Association* (294:5), 602-612.
28. Reich, B.H., and Benbasat, I. (1990), An Empirical Investigation of Factors Influencing the Success of Customer-oriented Strategic Systems, *Information Systems Research*, 1(3), 325-347.

29. Sabherwal, R., Jeyaraj, A. and Chowa, C. (2006) Information System Success: Individual and Organizational Determinants, *Management Science* (52:12), 1849-1864.
30. Schwarz, A. and Chin, W. (2007) Looking Forward: Toward an Understanding of the Nature and Definition of IT Acceptance, *Journal of the Association for Information Systems* (8:4), 230-243.
31. Silva, L. (2007) Post-positivist Review of Technology Acceptance Model , *Journal of the Association for Information Systems* (8:4), 255-266.
32. Szajna, B. (1996) Empirical Evaluation of the Revised Technology Acceptance Model, *Management Science* (42:1), 85-92.
33. Sorensen, S., Pinquart, M., and Duberstein, P. (2002) How Effective Are Interventions with Caregivers? An Updated Meta-Analysis, *The Gerontologist* (42:3), 356-372.
34. Steel, P., and Kammeyer-Mueller, J. (2002) Comparing Meta-Analytic Moderator Estimation Techniques Under Realistic Conditions, *Journal of Applied Psychology* (87:1), 96-111.
35. Straub, D.W. (1994), The Effect of Culture on IT Diffusion: E-mail and FAX in Japan and the U.S., *Information Systems Research*, 5(1), 23-47.
36. Straub, D. W. and Burton-Jones, A. (2007) Veni, Vidi, Vici: Breaking the TAM Logjam, *Journal of the Association for Information Systems* (8:4), 223-229.
37. Swanson, E. (1988) *Information System Implementation: Bridging the Gap Between Design and Utilization*. Irwin, Homewood, IL.
38. Venkatesh, V. and Morris, M. (2000) Why Don't Men ever Stop to Ask for Directions? Gender, Social Influence, and their Role in Technology Acceptance and Usage Behavior, *MIS Quarterly* (24:1), 115-139.
39. Venkatesh, V., Davis, F. and Morris, M. (2007) Dead or Alive? The Development, Trajectory and Future of Technology Adoption Research, *Journal of the Association for Information Systems* (8:4), 267-286.
40. Venkatesh, V., Morris, M. and Ackerman, P. (2000) A Longitudinal Field Investigation of Gender Differences in Individual Technology Adoption Decision-Making Processes, *Organizational Behavior and Human Decision Processes* (83:1), 33-60.
41. Venkatesh, V., Morris, M., Davis, G. and Davis, F. (2003) User Acceptance of Information Technology: Toward a Unified View, *MIS Quarterly* (27:3), 425-478.