E-Learning Adoption and Assimilation across Cultures: A Research Agenda

Said Saleh A. Al-Gahtani

Professor of CIS

King Khalid University

P O Box 3247

Abha 61471, Saudi Arabia

Tel: +96672417126 Fax: +96672417587

Mobile: 0504735188

E-mail: ssalgahtani@kku.edu.sa

drsaidsaleh@gmail.com

E-Learning Adoption and Assimilation across Cultures: A Research Agenda

Abstract

Technology-assisted learning has become increasingly crucial for academic studies and corporate training. E-learning has potentially become one of the most significant developments in the information systems and technologies. Motivated by such compelling advantages as geographical reach, learner control, and cost effectiveness in course delivery and management, educational institutions and professional organizations are embracing technology-assisted learning by implementing an expanding array of technology-enabled platforms. This paper is to set out a research agenda for investigating e-learning adoption and assimilation across cultures. The specific objectives of this study were: (i) to develop an extended technology acceptance model using TAM3 for the determinants of the adoption and assimilation of e-learning; (ii) to set out a research agenda for investigating e-learning adoption and assimilation across cultures; and (iii) to outline possible outcomes of the study, such as, managerial interventions and controls for better organizational e-learning management. It is hoped that this paper lends a roadmap to more understanding of the success factors and pre and post-implementation interventions contributing to the adoption and assimilation of the of e-learning systems globally.

Keywords: E-learning, technology adoption and assimilation, Technology Acceptance Model 3, TAM, cross-cultural research.

INTRODUCTION

Technology-assisted learning has become increasingly crucial for academic study and corporate training. E-learning has become one of the most significant developments in the information systems (IS) industry (Wang, 2009). Motivated by such compelling advantages as geographical reach, learner control, and cost effectiveness in course delivery and management, educational institutions and professional organizations are embracing technology-assisted learning by implementing an expanding array of technology-enabled platforms. The economic value of technology-assisted learning has grown substantially; the U.S. market alone amounted to 17.5 billion dollars in 2007 and the global market is projected to exceed 52.6 billion dollars by 2010 (Global Industry Analysts, 2008).

According to new report by Global Industry Analysts, Inc., it has been claimed that e-learning has emerged as an imperative tool to impart knowledge in the academic as well as corporate sectors. Since e-learning has several advantages in terms of cost reduction, simplified training programs, flexibility, and convenience; it is posited to become an integral component of information dissemination, and emerges as the new paradigm of modern education. Backed by several favorable trends, the world e-learning market is projected to exceed US$52.6billion by 2010 (Global Industry Analysts, 2008).

E-Learning is an efficient method of education using the Internet. With eLearning you can make courses available for students to study any time and from anywhere, in addition to interacting with them in an easy and effective way (Chen, Wei, Wu, & Uden, 2009; Wang, 2009). Apparently, e-learning became a requirement for the foreseen educational process not only to cope with fast occurring developments in educational institutions all over the world, but also for its real impact on enhancing education and educational outcomes.

A number of studies have already examined e-learning on the internet, with most of these studies investigating the relationship between instructional materials and the structure of such materials, teaching strategies, the personalities of learners and the self-control and behavior of students in terms of their self-discipline when using the internet as a main teaching tool (Lee, 2006). Recently, Hsbollah & Idris (2009) have investigated e-learning adoption using the Rogers (2003) diffusion innovation theory (DOI) and Norzaidi & Salwani (2009) have evaluated e-learning technology resistance by students and technology satisfaction on students' performance.

It is clearly of importance to gain an understanding of the success factors contributing to the adoption and assimilation of the Web-based e-learning systems by learners. With this as the ultimate aim, this paper sets out to outline a research agenda to investigate the factors that were rarely tested in e-learning contexts with the latest version of the technology acceptance model (i.e., TAM3). The specific objectives of this study are: (i) to develop an extended TAM for the determinants of the adoption and assimilation of e-learning; (ii) to set out a research agenda for investigating e-learning adoption and assimilation across cultures; and (iii) to outline possible outcomes of the study, such as, managerial interventions and controls for better organizational e-learning management.

The rest of this paper deals with a background of IT acceptance and adoption with TAM development, cross-cultural research, research model and hypotheses, research design, and discussion and conclusions.

IT ACCEPTANCE AND ADOPTION – BACKGROUND

Advances in information systems technology (IT) are rapidly modernizing the way we live and work across the globe. Despite incredible advances in technology, organizations are still facing the problems of underutilization or rejection of implemented technologies (Baker, Al-Gahtani & Hubona, 2010). In the following the theories of technology acceptance are briefly reviewed with emphasis on the latest theory (model) – Technology Acceptance Model 3.

Theories of Technology Adoption and Assimilation Models

There are multiple theoretical frameworks for IT Adoption and assimilation in the IT/IS literature that results in several potential models. Examples of these theoretical frameworks are: DOI, SCT, TRA, and TPB. One of the most popular models stemmed from TRA, DOI and SCT is the Technology Acceptance Model (TAM). The original TAM (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989) proposed that two belief constructs, perceived usefulness and perceived ease of use, are primary determinants of an individual's behavioral intention to use an information technology. Behavioral intention was postulated as the predictor of actual usage behavior.

There were successive developments of TAM: TAM2, UTAUT, and finally TAM3. TAM2, proposed by Venkatesh and Davis (2000), was the first extension of the original TAM model that postulated particular antecedent constructs as predictors of perceived usefulness, the primary determinant of intention to use a system. These TAM2 antecedent constructs for perceived usefulness included social influence process variables (e.g. subjective norm, voluntariness, and image), as well as cognitive instrumental process variables (e.g. job relevance, output quality, and result demonstrability). Subjective norm, a social influence process, was also postulated to be a direct antecedent variable of intention to use a system. Venkatesh (2000) researched the determinants of perceived ease of use by integrating control, intrinsic motivation, and emotion into the original TAM model claiming that computer self-

efficacy, computer anxiety, and perceived enjoyment are viable antecedents to perceived ease of use.

Then in 2003, Venkatesh et al. synthesized the prevailing IT acceptance models (including TAM2) into the Unified Theory of Acceptance and Use of Technology (UTAUT) model. UTAUT was introduced as a composite model of user acceptance that better explained the variance in user intentions and usage of IT, compared to previous models. Like TAM2, UTAUT further explored the impact of moderating (i.e. interacting) variables on both behavioral intention and on self-reported usage behaviors. Fortunately, the original TAM, TAM2 and UTAUT were tested in the Arabic context and showed to hold very well ((Al-Gahtani, 2008); (Baker, Al-Gahtani, & Hubona, 2010); (Al-Gahtani, Hubona, & Wang, 2007), respectively).

Technology Acceptance Model ─ TAM3

The most recent and comprehensive developments of TAM is manifested in TAM3 (Venkatesh and Bala, 2008). Venkatesh & Bala (2008) synthesized prior research on TAM and developed a theoretical framework that represents the cumulative body of knowledge accumulated over the years from TAM research. This results in four different types of determinants of perceived usefulness and perceived ease of use—*individual differences, system characteristics, social influence, and facilitating conditions*. Individual difference variables include personality and/or demographics (e.g., traits or states of individuals, gender, and age) that can influence individuals' perceptions of perceived usefulness and perceived ease of use. System characteristics are those salient features of a system that can help individuals develop favorable (or unfavorable) perceptions regarding the usefulness or ease of use of a system. Social influence captures various social processes and mechanisms that guide individuals to formulate perceptions of various aspects of an IT. Finally, facilitating conditions represent organizational support that facilitates the use of an IT. In summary, Venkatesh & Bala (2008) combined TAM2 (Venkatesh & Davis, 2000) and the model of the determinants of perceived ease of use (Venkatesh, 2000), and developed an integrated model of technology acceptance—TAM3. TAM3 presents a complete nomological network of the determinants of individuals' IT adoption and use. An extended TAM3 (with culture added) is shown in Figure 1.

APPROACHING CROSS-CULTURAL RESEARCH

Does culture have an influence on the perceptions and acceptance of technology? In one of the earliest studies to address this question, Straub (1994) found that the cultural differences between Japan and the United States did have an effect on the perceptions and selective use of email and fax technologies. In a study of Arab cultures, Straub et al. (2001) gathered data from five Arab nations and determined that Arab cultural beliefs were powerful predictors of resistance to information systems technologies. Broader studies have also found similar patterns of cultural influence on technology acceptance. Parboteeah et al (2005) conducted a 24 nation study and found that cultural factors were influential in the perceived usefulness of information technology. The results of these studies would seem to provide clear evidence that culture does, in fact, have an influence on the perceptions and acceptance of technology.

From the above chronological development of TAM we can see how environmental and cultural variables proved to be important predictors of IT adoption and assimilation. Hence, it is of paramount importance to investigate the roles of cultural variables and how they could be situated via different cultures in cross-cultural research.

There are many theoretical frameworks of the factors promoting/inhibiting the adoption and use of IT in organizational settings, but few have been validated in non-Western cultures. The lack of frameworks that have been demonstrated to be robust across cultures can limit the development of theoretical extensions in this area (Maheswaran & Shavitt, 2000). The choice of *emic* research, indigenous and conducted on the basis of culture-specific frameworks, versus *etic* research, which examines cultural differences using previously established universal frameworks as benchmarks, can confuse the issue about the most appropriate orientation of cross-cultural research (Maheswaran & Shavitt, 2000; Morris, Leung, Ames, & Lickel, 1999; Peng, Peterson, & Shyi, 1991).

In conducting this research, the investigation follows Berry's (1989) five-step process as a basis for an integrated *etic/emic* approach to studying IT adoption differences among cultures. The first step is to examine the research problem in one's own culture, developing a conceptual framework and a relevant instrument. The study conducted by Venkatesh & Bala (2008) provides the foundation for an initial *emic* study of the adoption of IT among professional workers in the USA. The second step Berry recommends is to transport this

measurement model so as to examine the same issue in another culture, as an imposed *etic* study. Accordingly, an objective of our study is to report the findings of an imposed *etic* study of predicted IT use in Saudi Arabia, New Zealand, Japan and China. According to Berry (1989), the third step is to enrich the imposed *etic* framework with unique aspects of the second culture, and to then examine the two, culturally-diverse sets of findings for comparability. Accordingly, the findings from this study can be leveraged in future technology acceptance studies to continue to investigate predicted IT use in culturally-diverse settings.

RESEARCH MODEL AND HYPOTHESES

The most recent reformulation of TAM is TAM3 reflected in the published study by Venkatesh and Bala (2008). The application of TAM3 across four longitudinal field studies revealed that both the social influence processes (subjective norm, voluntariness and image) and cognitive instrumental processes (job relevance, output quality, result demonstrability, and perceived ease of use), the anchors (computer self-efficacy, perceptions of external control, computer anxiety, and computer playfulness), and the adjustments (perceived enjoyment and objective usability) significantly influenced user acceptance. The results showed that the model accounted for 52-67% of the variance in usefulness perceptions, 43-52% of the variance in ease of use perceptions and 40-53% of the variance in usage intentions. This particular emic study using TAM3 focuses on the three groups of antecedents: (1) social influence processes and the cognitive instrumental processes, (2) the anchors and (3) the adjustments using a multi-national survey to investigate their impact through a cross-cultural lens on technology adoption.

Our research model differs from TAM3 in two key respects. In our study, a large multi-national survey, data on the model constructs were collected at a single point in time, as opposed to collecting several measurements over time. Our focus is on how well the social

influence processes, the cognitive instrumental processes, the anchors and the adjustments predict technology adoption, in particular the implicit cultural effects on these processes and factors which affect technology adoption. The explicit cultural dimensions moderating effects on the TAM key relationships will also be investigated as shown in the research model (Figure 1).

Accordingly, this study is set to investigate the following main five hypotheses:

H1: The original TAM will hold well but differently across cultures (i.e., the four countries).

H2: The extended TAM (TAM3) will hold well but differently across cultures (i.e., the four countries).

H3: The social influence and cognitive instrumental processes, the anchors and the adjustments will significantly influence user acceptance of the e-learning system,

H4: The moderators in TAM3 (experience and voluntariness) will significantly influence the intended paths as in Figure 1.

H5: The culture factor dimensions (Power Distance, Uncertainty Avoidance, Individualism/Collectivism, Masculinity/Femininity, and Long-term Orientation) will significantly moderate the intended paths as in Figure 1.

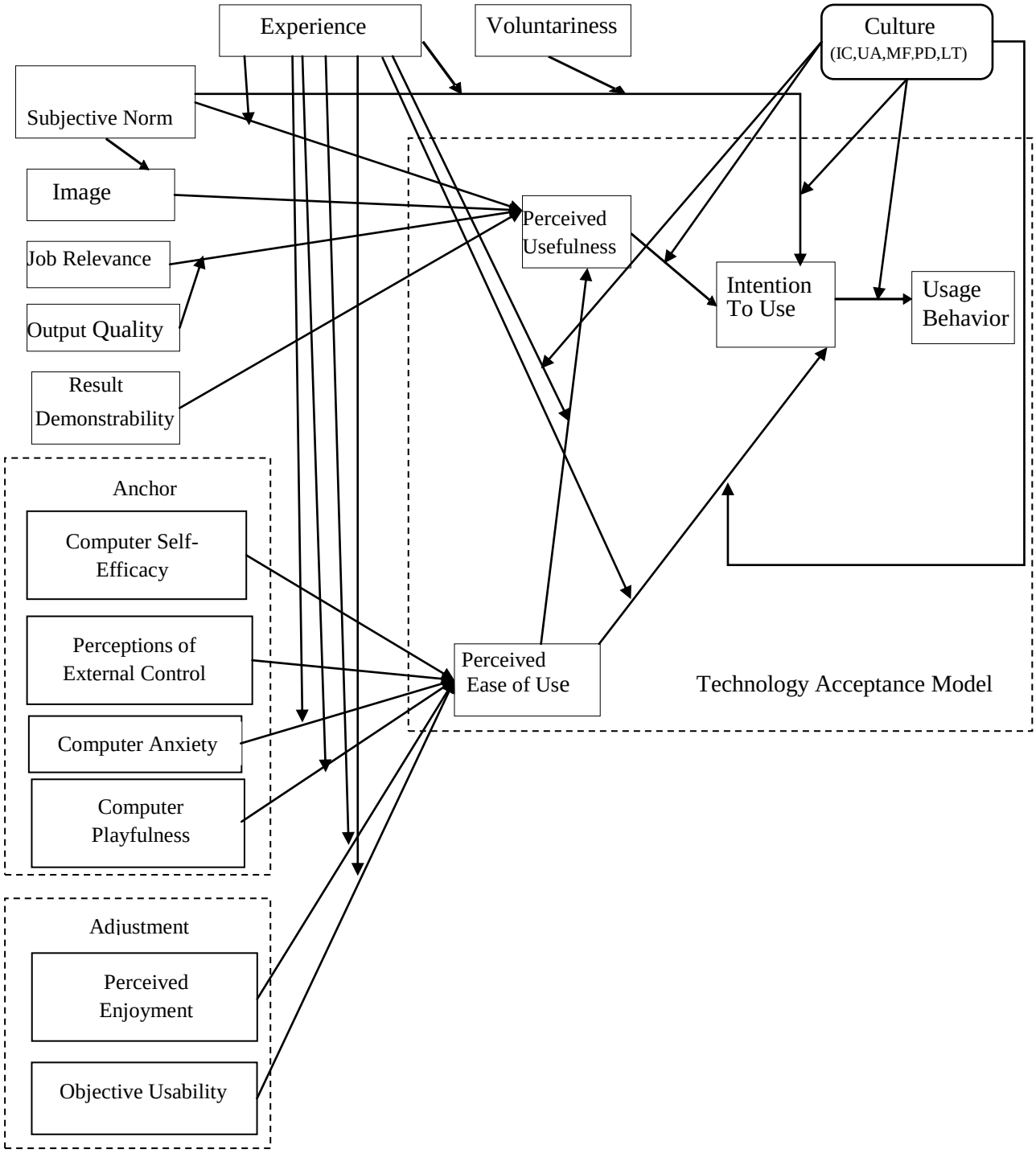

Figure1: Research Model (an Extended TAM3)

RESEARCH DESIGN

METHOD

Population Sample

Essentially, this research is a part of a large research collaboration project between King Khalid University (Saudi Arabia) and the University of Waikato (New Zealand). The population sample for this study will consist of university students reporting on "any hands on uses of learning management systems (LMS) for the purpose of their study." Participants in the study are planned to be university students from Saudi Arabia, New Zealand, Japan and China in variety of major specialty areas including engineering, sciences, business and social sciences, engaged in the use of LMS for the purpose of their study. It is also planned to attain representative samples from those countries including gender and different course levels to participate in the study.

Measurement Items

All survey items, originally published in English, were adapted for this study by translating them into the target language (Arabic, Japanese or Chinese) using Brislin's (1986) back translation method. The items were translated back and forth between English and the target language by several bilingual professors. The process was repeated until both versions converged.

We plan to use validated items from prior research to test the research model. Appendix A presents a list of items for all the constructs in the research model. TAM constructs—that is, perceived usefulness (PU), perceived ease of use (PEOU), and behavioral intention (BI)—will be operationalized using items adapted from Davis (1989) and Davis et al. (1989). Consistent with Davis (1989), use (USE) will be operationalized by asking the respondents, "On average, how much time to you spend on the system every day? hours and minutes." Our research design allows us to collect the use data separate from its determinants (e.g., behavioral intention, perceived usefulness, etc.).

Operationalization of the determinants of perceived ease of use (i.e., computer self-efficacy, perceptions of external control, computer playfulness, computer anxiety, objective usability, and perceived enjoyment) is consistent with Venkatesh (2000). Computer self-

efficacy (CSE) will be measured using four items adapted from Compeau and Higgins (1995). Perceptions of external control (PEC) will be measured using four items adapted from the scale of facilitating conditions developed by Mathieson (1991) and Taylor and Todd (1995). Computer playfulness (CPLAY) will be measured using four items adapted from Webster and Martocchio (1992). Computer anxiety (CANX) will be measured using four items used in Venkatesh (2000).

Following Venkatesh & Bala (2008) and human-computer interaction (HCI) research, objective usability (OU) will be operationalized by computing a novice-to-expert ratio of effort. During the training program, each participant will be asked to perform a set of tasks using the new system. The system recorded the time each participant took to accomplish the tasks. The time will then be compared to the time taken by an expert to accomplish the same tasks to determine a ratio, which served as the measure of objective usability for each participant. Perceived enjoyment (ENJ) was measured using four items adapted from Davis et al. (1992).

Determinants of perceived usefulness will be measured using items from Venkatesh and Davis (2000). Subjective norm (SN) was measured using four items adapted from Taylor and Todd (1995). Image (IMG) and result demonstrability (RES) will be operationalized using three and four items respectively from Moore and Benbasat (1991). Job relevance (REL) and output quality (OUT) will be measured using three items each adapted from Davis et al. (1992).Voluntariness (VOL) will be assessed using three items from Moore and Benbasat (1991).

The culture factor consists of five dimensions (Individualism/Collectivism, Uncertainty Avoidance, Masculinity/Femininity, Power Distance, Long-term Orientation). The five cultural dimensions items to opertionalize the culture factor are adopted from (Hofstede, 1984, Dorfman & Howell, 1988, and Srite & Karahanna, 2006). Appendix A shows the measurement items to be incorporated in the survey questionnaire to collect the data for the present study.

DATA COLLECTION

As stated earlier, this study is a multi-national study set to investigate the adoption and assimilation of e-learning systems across cultures. Hence, it is intended to collect data from

the participating countries (Saudi Arabia, New Zealand, Japan and China) which are supposedly culturally different to enable researchers to test TAM3 across various cultures. Survey method including paper, self-administered, and web-based questionnaires are feasible methods to collect the study data. Details of the data collection method will be further discussed later in the final report of the study project.

Data will be collected from representative samples of Japanese and Chinese students. Although the data will be collected from the Japanese and the Chinese students in New Zealand, researches will do their best to collect their data while putting those groups in their cultural context.

DATA ANALYSIS

To analyze the study data, it is intended to use structural equation modeling (SEM) software packages. SEM software packages are most sophisticated statistical analysis and thus most appropriate for such complex research models (like our case in this study). SEM software packages enable researches to analyze both the measurement model and the structural (causal) model concurrently. Among the popular packages are: Partial Least Squares (PLS) – Smart PLS and PLS-Graph, Linear Structural Relations (LISREL), and AMOS.

By using the SEM software packages, researches are enabled to analyze multiple results of the measurement model including: factor reliabilities, loadings, cross-loadings, variance explained in each dependent variable, and average variance extracted for each factor. With regard to the structural (causal) model, researches are enabled to analyze direct, indirect, and total effects besides several fit indices for the model in connection to the research data.

DISCUSSION AND CONCLUSIONS

ITs are becoming increasingly complex and implementation costs are very high and implementation failures of many of today's ITs cost millions of dollars for organizations (Venkatesh and Bala, 2008). Further, low adoption and high underutilization of ITs have been a major problem for organizations in terms of realizing the benefits (both tangible and intangible) of IT implementations (Jasperson et al., 2005). If we can develop a rich understanding of the determinants of IT adoption and use and interventions that can favorably

influence these determinants, managers can proactively decide on implementing the right interventions to minimize resistance to new ITs and maximize effective utilization of ITs (Venkatesh and Bala, 2008). Based on a comprehensive nomological network of IT adoption and assimilation —an extended TAM3—we presented a set of pre- and post-implementation interventions that we believe should be the object of future scientific inquiry.

This paper is to set out a research agenda for investigating e-learning adoption and assimilation across cultures. It is hoped that this paper lends a roadmap to better understanding of the success factors and pre and post-implementation interventions contributing to the adoption and assimilation of the of e-learning systems globally.

There are three objectives for this study: (i) giving an outline for empirical testing of the proposed integrated model in different cultures; (ii) presenting a research agenda that focused on potential pre- and post-implementation interventions that could enhance students' adoption and use of IT; and (iii) the results (of executed research) enables the understanding of how pre- and post-implementation interventions can help students make better adoption decisions about these e-learning systems and for LMS managers to make effective implementation decisions.

TAM3 explanations of interventions (Venkatesh & Bala, 2008) can support managerial decision making in two ways. First, managers will now have a framework to decide what interventions to apply during pre- and post-implementation stages and for what types of system. For instance, (i) for a complex system, perhaps, interventions that will create favorable ease of use perceptions will be relevant (e.g., design characteristics, user participation, training, and peer support); (ii) for a voluntary system, interventions that will influence the determinants of perceived usefulness will be important to implement (e.g., design characteristics, user participation, incentive alignment, training, organizational and peer support); and (iii) for interorganizational systems that affect organizational business processes (e.g., Saeed, Malhotra, & Grover, 2005) or a customer relationship management system that is critical to service delivery (e.g., Froehle, 2006), interventions, such as user participation, peer support, and management support, will be particularly relevant. Second, managers can decide on resource allocation for interventions based on the impact of interventions on different determinants of IT adoption and type of systems. For example, if design characteristics cannot be changed in a system, managers can allocate more resources to

training and user participation to make employees familiar with the systems. The implementation of interventions is, of course, not a silver bullet for greater IT adoption and effective utilization. Implementation of interventions can increase system development costs substantially. Hence, managers have to be mindful in their decisions about implementing interventions and our work identifies specific interventions that can serve as levers for managers.

A prominent and eminent contribution of this study is the outline for modeling culture as a moderating factor integrated into TAM3. This research agenda lends a ready executable research design for researchers interested in cross-cultural research in IT adoption across cultures with constructs' instruments and scales readily available for application.

Acknowledgment

The author wishes to thank Dr Sally Jo Cunningham and Mr. Bill Rogers from the University of Waikato – New Zealand for their support in this research project.

REFERENCES

Al-Gahtani, S.S. (2008). Testing for the Applicability of the TAM Model in the Arabic Context: Exploring an Extended TAM with Three Moderating Factors. Information Resources Management Journal**,** Vol. 21, No. (4), pp. 1-26.

Al-Gahtani, S. S., Hubona, G. S., & Wang, J. (2007). Information Technology (IT) in Saudi Arabia: Culture and the Acceptance and Use of IT. Information and Management, 44(8), 681-691.

Al-Gahtani, S. S. (2004). Computer Technology Acceptance Success Factors in Saudi Arabia: An Exploratory Study. Journal of Global Information Technology Management, 7(1), 5-29.

Baker, E.W., Al-Gahtani, S.S., & Hubona, G.S. (2010). Cultural Impacts on Acceptance and Adoption of Information Technology in a Developing Country, Journal of Global Information Management, 18(3), pp 35-58.

Berry, J. W. (1989). Imposed etics-emics-derived etics: The operationalization of a compelling idea. International Journal of Psychology, 24, 721-735.

Chen, N. S., Wei, C. W., Wu, K. T., & Uden, L. (2009). Effects of high level prompts and peer assessment on online learners' reflection levels. Computers and Education, 52(2), 283-291.

Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. MIS Quarterly, 19, 189–211.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. MIS Quarterly, 13(3), 319-340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and intrinsic motivation to use computers in the workplace. Journal of Applied Social Psychology, 22, 1111–1132.

Dorfman, P.W., & Howell, J. (1988). Dimensions of national culture & effective leadership patterns: Hofstede revisited. In E.G. McGowan (Ed.), Advances in international comparative management (pp. 127-149). Greenwich, CT: JAI Press.

Froehle, C. M. (2006). Service personnel, technology, and their interaction in influencing customer satisfaction. Decision Sciences, 37, 5–38.

Global Industry Analysts, Inc. (2008). E-Learning: A Global Strategic Business Report, May 2008. Available at: http://www.strategyr.com/MCP-4107.asp. Last accessed: 16 March 2009.

Hofstede, G. (1984). Culture's consequences: International differences in work-related values. Newbury Park, CA: Sage.

Hsbollah, H., & Idris, K. (2009) E-learning adoption: the role of relative advantages, trialability and academic specialization. Campus-Wide Information Systems, Vol. 26 No. 1, pp. 54-70.

Jasperson, J. S., Carter, P. E., & Zmud, R. W. (2005). A comprehensive conceptualization of the post-adoptive behaviors associated with IT-enabled work systems. MIS Quarterly, 29, 525–557.

Maheswaran, D., & Shavitt, S. (2000). Issues and New Directions in Global Consumer Psychology. Journal of Consumer Psychology, 9(2), 59-66.

Mathieson, K. (1991). Predicting user intentions: Comparing the technology acceptance model with the theory of planned behavior. Information Systems Research, 2, 173–191.

Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. Information Systems Research, 2, 192–222.

Morris, M. W., Leung, K., Ames, D., & Lickel, B. (1999). Views from Inside and Outside: Integrating Emic and Etic Insights about Culture and Justice Judgment. Academy of Management Review, 24(4), 781-796.

Norzaidi, M., & Salwani, M. (2009). Evaluating technology resistance and technology satisfaction on students' performance. Campus-Wide Information Systems, Vol. 26 No. 4, pp. 298-312.

Parboteeah, D. V., Parboteeah, K. P., Cullen, J. B., & Basu, C. (2005). Perceived usefulness of information technology: A cross-national model. Journal of Global Information Technology Management, 8(4), 29.

Peng, T. K., Peterson, M. F., & Shyi, Y.-P. (1991). Quantitative Methods in Cross-National Management Research: Trends and Equivalence. Journal of Organizational Behavior, 12(2), 87-107.

Rogers, E.M. (2003). Diffusion of Innovations (5th Ed). New York, The free press.

Saeed, K. A., Malhotra, M. K., & Grover, V. (2005). Examining the impact of interorganizational systems on process efficiency and sourcing leverage in buyer-supplier dyads. Decision Sciences, 36, 365–396.

Srite, M., & Karahanna, E. (2006). The role of espoused national cultural values in technology acceptance. MIS Quarterly, 30(3), 1-26.

Straub, D. W. (1994). "The Effect of Culture on It Diffusion: E-Mail and Fax in Japan and the United States." Information Systems Research, 5(1): 23-47.

Straub, D. W., et al. (2001). "Transfer of information technology to the Arab world: A test of cultural influence modeling." Journal of Global Information Management, 9: 6-28.

Taylor, S., & Todd, P. A. (1995). Understanding information technology usage: A test of competing models. Information Systems Research, 6, 144–176.

Venkatesh, V. (2000) Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model, Information Systems Research, 11, 4, 342-365.

Venkatesh, V., and Davis, F.D. (2000) A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. Management Science. 46(2), pp. 186-204.

Venkatesh, V., and Bala, H. (2008). Technology Acceptance Model 3 and a Research Agenda on Interventions. Decision Sciences, 39(2), pp. 273-315.

Wang, T. (2009). Rethinking teaching with information and communication technologies (ICTs) in architectural education. Teaching and Teacher Education, 25(8), 1132-1140.

Webster, J., & Martocchio, J. J. (1992). Microcomputer playfulness: Development of a measure with workplace implications. MIS Quarterly, *16*, 201–226.

APPENDIX A: ITEMS FOR TAM3 CONSTRUCTS

Constructs	Items[a]
Perceived Usefulness (PU)	
PU1	Using the system improves my performance in my job.
PU2	Using the system in my job increases my productivity.
PU3	Using the system enhances my effectiveness in my job.
PU4	I find the system to be useful in my job.
Perceived Ease of Use (PEOU)	
PEOU1	My interaction with the system is clear and understandable.
PEOU2	Interacting with the system does not require a lot of my mental effort.
PEOU3	I find the system to be easy to use.
PEOU4	I find it easy to get the system to do what I want it to do.
Computer Self-Efficacy (CSE)	
	I could complete the job using a software package . . .
CSE1	. . . if there was no one around to tell me what to do as I go.
CSE2	. . . if I had just the built-in help facility for assistance.
CSE3	. . . if someone showed me how to do it first.
CSE4	. . . if I had used similar packages before this one to do the same job.
Perceptions of External	
PEC1	I have control over using the system.
PEC2	I have the resources necessary to use the system.
PEC3	Given the resources, opportunities and knowledge it takes to use the system, it would be easy for me to use the system.
PEC4	The system is not compatible with other systems I use.
Computer Playfulness (CPLAY)	
	The following questions ask you how you would characterize yourself when you use computers:
CPLAY1	. . . spontaneous
CPLAY2	. . . creative
CPLAY3	. . . playful
CPLAY4	. . . unoriginal
Computer Anxiety (CANX)	
CANX1	Computers do not scare me at all (reversed).
CANX2	Working with a computer makes me nervous.
CANX3	Computers make me feel uncomfortable.
CANX4	Computers make me feel uneasy.
Perceived Enjoyment (ENJ)	
ENJ1	I find using the system to be enjoyable.
ENJ2	The actual process of using the system is pleasant.
ENJ3	I have fun using the system.

Objective Usability (OU) No specific items were used. It was measured as a ratio of time spent by the subject to the time spent by an expert on the same set of tasks.

Subjective Norm (SN)
SN1 People who influence my behavior think that I should use the system.
SN2 People who are important to me think that I should use the system.
SN3 The senior management of this business has been helpful in the use of the system.
SN4 In general, the organization has supported the use of the system.

Voluntariness (VOL)
VOL1 My use of the system is voluntary.
VOL2 My supervisor does not require me to use the system.
VOL3 Although it might be helpful, using the system is certainly not compulsory in my job.

Image (IMG)
IMG1 People in my organization who use the system have more prestige than those who do not.
IMG2 People in my organization who use the system have a high profile.
IMG3 Having the system is a status symbol in my organization.

Job Relevance (REL)
REL1 In my job, usage of the system is important.
REL2 In my job, usage of the system is relevant.
REL3 The use of the system is pertinent to my various job-related tasks.

Output Quality (OUT)
OUT1 The quality of the output I get from the system is high.
OUT2 I have no problem with the quality of the system's output.
OUT3 I rate the results from the system to be excellent.

Result Demonstrability (RES)
RES1 I have no difficulty telling others about the results of using the system.
RES2 I believe I could communicate to others the consequences of using the system.
RES3 The results of using the system are apparent to me.
RES4 I would have difficulty explaining why using the system may or may not be beneficial.

Behavioral Intention (BI)
BI1 Assuming I had access to the system, I intend to use it.
BI2 Given that I had access to the system, I predict that I would use it.
BI3 I plan to use the system in the next <n> months.

Use (USE)
USE1 On average, how much time do you spend on the system each day?

Cultural Dimensions (Other Characteristics) Survey

Please "feel at home" and indicate the degree to which you agree or disagree with the following statements about general characteristics:

Individualism/Collectivism (IC)

In general, I think that…

IC1 Being loyal to a group is more important than individual gain.
IC2 Being accepted as a member of a group is more important than having autonomy and independence on the job.
IC3 Group success is more important than individual success.
IC4 It is more important for a manager to encourage loyalty and a sense of duty in subordinates than it is to encourage individual initiative.
IC5 Individual rewards are not as important as group welfare. (reversed)
IC6 I value my independence more than being accepted by others. (reversed)

Uncertainty Avoidance (UA)

In general, I think that…

UA1 It is important to have job requirements and instructions spelled out in detail so that employees always know what they are expected to do.
UA2 Managers expect employees to closely follow instructions and procedures.
UA3 Rules and regulations are important because they inform employees what the organization expects from them.
UA4 Standard operating procedures are helpful to employees on the job.
UA5 Instructions foe operations are important for employees on the job.

Masculinity/Femininity (MF)

In general, I think that…

MF1 It is preferable to have a man in high-level position rather than a woman.
MF2 It is more important for men to have a professional career than it is for women to have a professional career.
MF3 There are some jobs in which a man can always do better than a woman
MF4 Women do not value recognition and promotion in their work as much as men do.

Power Distance (PD)

In general, I think that…

PD1 Managers should make most decisions without consulting their subordinates.
PD2 It is frequently necessary for a manager to use authority and power when dealing with subordinates.
PD3 Managers should seldom ask for the opinion of employees.
PD4 Managers should avoid of-the-job social contacts with employees.
PD5 Employees should not disagree with management decisions.
PD6 Managers should not delegate important tasks to employees.

Long-term Orientation (LT)

In general, I think that…

LT1 Managers must be persistent to accomplish objectives.
LT2 There is a hierarchy to on-the-job relationships and it should be observed.
LT3 A good manager knows how to economize.
LT4 It is important to have a conscience in business.
LT5 Personal stability is not critical to success in business.
LT6 Respect for tradition hampers performance.
LT7 The exchange of favors and gifts is not necessary to excel.
LT8 Uploading one's personal image makes little difference in goal achievement.

[a] All items were measured on a 7-point Likert scale (where 1: *strongly disagree*; 2: *moderately disagree*, 3: *somewhat disagree*, 4: *neutral* (neither disagree nor agree),
5: *somewhat agree*, 6: *moderately agree*, and 7: *strongly agree*), except computer self-efficacy, which was measured using a 10-point Guttman scale.