ADOPTION OF CLOUD COMPUTING IN HIGHER

EDUCATION INSTITUTIONS IN NIGERIA

BY

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ABSTRACT

The study examines the adoption of cloud in the higher educational institution in Nigeria. The nine variable were used to examine the adoption of cloud computing in order to make a decision by HEIs management in Nigeria to see the usefulness to adopt cloud as well as the benefit and significance on cloud computing. The nine factors were examined in this study there are: relative advantage, compatibility, complexity, trailibility, top management, firm size, amount of information, pressure coercive and quality of internet connection. This study was adopted innovation diffusion theory. Technological, organizational environmental (TOE) and technology acceptance model to explain the adoption of cloud computing in HEIs in Nigeria. Quantitative method was used to collect data by distributing the questionnaire to 200 people from higher education institutions in Nigeria. The finding in this study was used smart (PLS) to analyze the date which seven variable were supported and the three were not support to explain the adoption of cloud computing in higher education in Nigeria. this study was carried out in the higher educational institutions in Nigeria to adopt cloud computing, this study is limit on generalize the findings.this study encourage the management in HEIs to make move on cloud computing to their education by a start from trailability to perceive the benefit on cloud computing this study is contribute to the higher educational institutions to try to adopt cloud computing as new technology to transform and seeing what way to benefit to their educational system. This study recommends to the management to support and make the decision to adopt cloud computing without their support no cloud computing adoption.

Keywords: cloud computing, technology-organisation-enveronment(TOE), innovation diffusion theory(IDT), technology acceptance theory (TAM)

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ABBREVIATION

higher Education Institutions Innovation Diffusion Theory. (IDT) Technological, Organizational Environmental (TOE) Technology Acceptance Model (TAM) Smart Primer on Partial Least Squares (SmartPLS)

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This study will start with an introduction which is chapter also follow by background of study which will bring out what has been done, what has been known and what need to be done or available. Issues that face in HEIs in Nigeria will be the next which is problem statement which this study will explore on. Next is the research question and the objective of this research. Significance and scope of the study were followed lastly definition of terms and how the whole chapters will carry out which is an organization of the study.

1.1 Background of Study

Technology is everywhere in today's life, world is changing and transform with new development and innovation in technology. Our life is used to technology to perceive new thing. There is new technology innovation that is going on around the world which can make changes to your life and feel comfortable with it. Among of new innovative technology that is increasing use around the world is cloud computing. Cloud computing is a metaphor used to describe networks. The term used to explain cloud computing means host everything that relating to delivery service over the internet. It is among the future generation which categorized into three platforms they are serviced of network, software and hardware that can spread out its usefulness to the user in anywhere they demand to (Manish et al. 2009). Cloud computing can be adopted in different field and different area such as health, education, government, organization and so on can adopt cloud computing to perceive changes to them directly or indirectly.

In this study, cloud computing will adopt to a higher educational institution in Nigeria, to explore how it will bring changes to some problem that were faced in education level in Nigeria.

The contents of the thesis is for internal user only

Reference

2010 from http://www.moneyweek.com/investment-advice/computing-industry-set-forashocking-change-43226.aspx

Africa Internet Usage. 22 May, 2012 < <u>http://www.internetworldstats.com</u>>

- Agarwal, R., and Prasad, J. (1998) A Conceptual and Operational Definition of Personal Innovativeness in the Domain of Information Technology, *Information Systems Research*, 9, 2, 204-215.
- Agarwal, R.; Prasad, J.(1997) *The role of innovation characteristics and perceived voluntariness in the acceptance of information technologies*. Decision Science. 28(3): 557-582.
- Agarwal, R.; Prasad, J. (1998) A conceptual and operational definition of personal innovativeness in the domain of information technology. Information system research, 92:204-215.
- Agarwal, R.; Prasad. J. (2000) A Field Study of Adoption of Software Process Innovations by Information Systems. IEEE Transactions on Engineering Management. 47(3): 295-380.
- Ajzen I and Fishbein M. (1980) Understanding attitudes and predicting social behaviour. (Prentice-Hall; Englewood Cliffs, NJ), p. 72-86
- Ajzen, I., & Fishbein, M. (1980). Understanding Attitudes and Predicting Social Behavior.Englewood Cliffs, NJ: Prentice Hall
- Akinsola O, Marlien H, Jacobs SJ. (2005) ICT provision to disadvantaged urban communities: A study in South Africa and Nigeria. International Journal of Education and Development using ICT 1.3.

- Anand, A., and Kulshreshtha, S. (2007) The B2C adoption in retail firms in India, Second International Conference on Systems
- Armbrust, M., Fox, A., Griffith, R., Joseph, A D., Katz, R; Konwinski, A., Lee, G., Patterson, D.,
 Rabkin, A., Stoica, I., & Zaharia, M. (2010). A View of Cloud Computing. *Communications of the ACM*, 53(4), 50-58. doi:10.1145/1721654.1721672
- B. & Escalante A., Eds., 3-19. Springer Science, Business Media.
- Behrend, T. A., Wiebe, E. N., London, J. E., & Johnson, E. C. (2011). Cloud computing adoption and usage in community colleges. *Behaviour & Information Technology*, 37(2), 231-240. doi:10.1080/0144929X.2010.489118
- Bellaaj, M. P. M. B. P. and Pecquet, P. (2008). Organizational, Environmental, and Technological Factors Relating to Benefits of Web Site Adoption. *International Journal of Global Business*. 1(1), 44-64.
- Berman, S., Kesterson-Townes, K., Marshall, A., & Srivatbsa, R. (2011). The power of cloud: driving business model innovation. Available at http://www.ibm.com/cloudcomputing/us/en/assets/power-of-cloud-for-bus-model-innovation.pdf
- Boit J, David M, James K. (2012)ICT and Education: Enabling Two Rural Western Kenyan Schools to Exploit Information Technology. Journal of Emerging Trends in Educational Research and Policy Studies (JETERAPS); 3.1: 55-60.
- Bose, R., and Luo, X. (2011). Integrative Framework for Assessing Firms' Potential to Undertake Green IT Initiatives via Virtualization - A Theoretical Perspective. *Journal of Strategic Information Systems*, 20(1), 38-54

- Bristow, R., Dodds, T., Northam, R. & Plugge, L. (2010). "Cloud Computing and the Power to Choose," EDUCAUSE, [Online], [Retrieved October 5, 2010
- Brodkin, J. (2008). Loss of customer data spurs closure of online storage service 'The Linkup' Available at http://www.networkworld.com/news/2008/081108-linkup-failure.html (accessed 26 September 2012
- Buyya, R., Yeo, C. S., Venugopal, S., Broberg, J., & Brandic, I. (2009). Cloud computing and emerging IT platforms: Vision, hype, and reality for delivering
- Chau, P. Y. K., and Tam, K. Y. (1997). Factors Affecting the Adoption of Open Systems: An Exploratory Study. *MIS Quarterly*, 21(1), 1-24.
- Chong, A. Y. L., Ooi, K. B., Lin, B. S., and Raman, M. (2009). Factors Affecting the Adoption Level of C-commerce: An Empirical Study. *Journal of Computer Information Systems*, 50(2), 13-22.
- Chong, A. Y., & Ooi, K. (2008). Adoption of interorganizational system standards in supply chains: an empirical analysis of RosettaNet standards. *Industrial Management & Data Systems*, 108 (4), 529 - 547. doi:10.1108/02635570810868371

Cloud Readiness Index. 2011. 23 October, 2012 http://www.asiacloud.org>

- Cooper, R.B. and Zmud, R.W. (1990). Information Technology Implementation Research: A Technological Diffusion Approach. *Management Science* 36(2), 123-139.
- Damanpour, F., & Schneider, M. (2006). Phases of the Adoption of Innovation in Organizations: Effects of Environment, Organization and Top Managers. British Journal of Management, 17, 215-236

- Davis, F. D. (1986). A Technology Acceptance Model for Empirically Testing New End user Information Systems: Theory and Results (PhD thesis). Massachusetts Institute of Technology, Cambridge, MA
- Davis, F.D. (1989) Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3). pp. 319-340
- Delmas, M.A. (2002). The Diffusion of Environmental Management Standards in Europe and in the United States: An Institutional Perspective. *Policy Sciences* 35(1), 91-119.
- Dialogic Making Innovation Thrives. A White Paper on Introduction to Cloud Computing. [Online]. Available: <u>https://www.dialogic.com/~/media/products/docs/whitepapers/12023-</u> cloudcomputing-wp.pdf
- DiMaggio, P. J., and Powell, W. W. (1983). The Iron Cage Revisited Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review*, 48(2). pp. 147-160.
- E. Craig, M. Diana, and T. Florence, (2009) "Cloud computing an overview," MIS 641, pp. 6,.
- Eastlick, M. A. (1996), Consumer Intention to Adopt Interactive Teleshopping. *Working Paper No. 96-113, Marketing Science Institute*, Cambridge, MA
- Edmonson, A., Winslow, A., Bohmer, R., & Pisano, G. (2003). Learning How and Learning What: Effects of Tacit and Codified Knowledge on Performance Improvement Following Technology Adoption. *Decision Sciences*, 34(2), 197-224
- EDUCAUSE. [Online], [Retrieved October 5, 2010

- F. E. Mehmet and B. K .Serhat, Cloud Computing For Distributed University Campus: A prototype suggestion, presented at The International Conference on The Future of Education Yildiz Technical University, Turkey.
- Fichman, R. G., & Kemerer, C. F. (1993). Adoption of software engineering process innovations: The case of object orientation. *MIT Sloan Management Review*, 34(2), 7-7
- Fishbein, M., & Ajzen, I. (1975). Beliefs, attitude, intention and behavior: An introduction to theory and research. Reading, MA: Addison-Wesley
- Fleischer, Mitchell, Alok K Chakrabarti and Louis G Tornatzky.(1990) The Processes of Technological Innovation. Lexington Books,
- Fuller, M.A., Hardin, A.M., and Scott, C.L. (2007) Diffusion of Virtual Innovation, *The DATA BASE for advances in information systems*, 38, 4, 40-44.

Furht, B. (2010). Cloud Computing Fundamentals. In Handbook of Cloud Computing, Furht

- G. Matt. (2010). Winds of change: Libraries and cloud computing.OCLC Online Computer Library Center. [Online]. pp. 5. Available: <u>http://www.oclc.org/content/dam/oclc/events/2011/files/IFLA-windsof-</u> changepaper.pdf
- G. Nandkishor, S. S. Seetal, and D. Bhagyashree. (2012). Use of cloud computing in library and information science field. International Journal of Digital Library Services. [Online].
 2(3). pp. 52-57. Available:

Gatignon, H., & Robertson, T. S. (1991), "Innovative Decision Processes. In T. S. Robertson, &H. H. Kassarjian. (eds.), *Handbook of Consumer Behavior* (pp. 316-348). Engle woodCliffs, NJ: Prentice Hall

Gleeson, E. (2009). Computing industry set for a shocking change. Retrieved May 10,

- Grover, V. (1993). An Empirically Derived Model for the Adoption of Customer-Based Interorganizational Systems. *Decision Sciences*, 24(3), 603-640
- Hernandez-Encuentra, E. Pousada, M., & Gomez-Zuniga B. (2009). ICT and Older People: Beyond Usability. Educational Gerontology, Special issue on Adult Education and Lifelong Learning, 35(3), 226 – 245.
- Hester, A.; Scott. J. 2007. Organizational Wiki Usage: A Conceptual Model. Paper presented at the Twenty-Eighth International Conference on Information Systems. Montreal. Quebec, Canada.
- Higa, K., Sheng, O. R. L., Hu, P. J.H., and Au, G. (1997). Organizational Adoption and Diffusion of Technological Innovation: A Comparative Case Study on Telemedicine in Hong Kong. *Thirtieth Hawaii International Conference on System Sciences*
- Hong, W., and Zhu, K. (2006) Migrating to Internet-based e-commerce: Factors affecting ecommerce adoption and migration at the firm level. *Information & Management*, 43, 204-221.
- Howcroft, B., Hamilton, R., & Hewer, P. (2002). Consumer attitude and the usage and adoption of home-based banking in the United Kingdom. *The International Journal of Bank Marketing*, 20 (3), 111–121

Hsu, C., Lu, H., & Hsu, H. (2007) Adoption of the mobile internet: An empirical study of

multimedia message service (MMS), Omega, 35(6), 715-726

http://hdl.handle.net/1944/1197 International Journal of Innovation, Management and Technology, Vol. 4, No. 5, October 2013 479 Technology.

Http://Www.Ijodls.In/Uploads/3/6/0/3/3603729/Vol._2_July_- _Sept._2012_Part-2.Pdf

http://www.rfppl.com/subscription/upload_pdf/Art.1_844.pdf

- Iacovou, C., Benbasat, I., and Dexter, A. (1995) 'Electronic Data Interchange and Small Organisations: Adoption and Impact of Technology', *MIS Quarterly*, 19(4), 465-485.
- Ifinedo P. (2011). Internet/E-Business Technologies Acceptance in Canada's SMEs: An Exploratory Investigation. *Internet Research*, 21(3), 255-281
- Jangra A, Bala R.(2011) Spectrum Of Cloud Computing Architecture: Adoption And Avoidance Issues. International Journal of Computing and Business Research; 2.2.
- Jeyaraj, A., Rottman, J.W., and Lacity, M.C. (2006) A review of predictors, linkages, and biases in IT innovation adoption research. *Journal of information technology*, 21, 1-23.
- Jianyuan, Y., & Zhaofang, Z. C. (2009). An empirical study on influence factors for organizations to adopt B2B e-marketplace in China. *Management and Service Science, 2009. MASS '09. International Conference on*, (pp. 1-6). Wuhan.
- Karahana, E.; Straub, D.; Chervancy, N. (1999). Information technology adoption across time: a cross-sectional comparison of preadoption and post-adoption beliefs. MIS Quarterly, 23(2): 183–213.
- Katz, R., Goldstein, P. & Yanosky, R. (2010). "Cloud Computing in Higher Education,"
- Keil, M., Beranek, P. M., & Konsynski, B. R. (1995). Usefulness and ease of use: field study evidence regarding task considerations. *Decision Support Systems*, 13 (1), 75-91

- Kendall, J.; Tung, L.; Chua, K.; Hong, C.; Ng, D.; Tan, S. (2001). Receptivity of Singapore's SMEs to electronic commerce adoption. Journal of Strategic Information Systems. 10(3): 223-242.
- Kolodinsky, J.M.; Hogarth, J.M.;and Hilgert. M.A. (2004) The adoption of electronic banking technologies by US consumers. The International Journal of Bank Marketing. 22(4:5) 238-59.
- Kshetri N. (2010)Cloud Computing in Developing Economies: Drivers, Effects, and Policy Measures.Proceedings of the PTC-10.
- Kwon, T.H., and Zmud, R.W. (1987), Unifying the fragmented models of information systems implementation: Critical issues in information systems research, Wiley & Sons Ltd., New York.
- lacovou, C.L., Benbasat, I., and Dexter, A.S. (1995) Electronic data interchange and small organizations: Adoption and impact of technology, *MIS Quarterly*, December
- Lee, E. J, Lee, J., & Eastwood, D. (2003). A two-step estimation of consumer adoption of technology-based service innovations. *The Journal of Consumer Affairs*, 37(2), 256-282
- Lee, M. K. O. (1998). Internet-based Financial EDI: Towards a Theory of Its Organizational Adoption. *Computer Networks and ISDN Systems*, 30(16-18), 1579-1588
- Lee, S. (2009). Adoption issues for cloud computing.7th International Conference on Advances in Mobile Computing andMultimedia (MoMM '09) (pp. 1-5). New York : ACM.
- Lertwongsatien, C., and Wongpinunwatana, N. (2003) E-commerce adoption in Thailand: an empirical study of small and medium enterprises (SMEs), *Journal of Global*

Information Technology Management, 6, 3, 67-83, 2003.

- Levy, M., and Powell, P. (2003) Exploring SME Internet adoption: toward a contingent model, *Eletronic Markets*, 13,2, 173-181
- Lin, H. F., and Lin, S. M. (2008). Determinants of E-Business Diffusion: A Test of the Technology Diffusion Perspective. *Technovation*, 28(3), 135-145.
- London JE and Johnson EC (2011) Cloud computing adoption and usage in community colleges, *Behaviour & Information Technology*, 30 (2) 231-240
- Low C, Chen Y and Wu M, (2011) Understanding the determinants of cloud computing adoption. *Industrial Management & Data Systems*, 111 (7) 1006-1023
- Lu, Y.; Quan, J.;Cao. X. (2009) The Perceived Attributes of Wi-Fi Technology and the Diffusion Gap among University Faculty Members: A Case Study. Communications of the Association for Information Systems. 24: 69-88.
- Lundblad, J.P. (2003) A review and critique of Rogers' diffusion of innovation theory as it applies to organizations. *Organization Development Journal*, Winter
- M. A. H. Masud and X. Huang, (2012) An E-learning System Architecture based on Cloud Computing, World Academy of Science, Engineering and Technology, vol. 62, pp. 74-78.
- M. Al-Zoube, S. A. El-Seoud and M. F. Wyne, (2010) Cloud Computing Based E-Learning System, International Journal of Distance Education Technologies, vol. 8, no. 2, , pp. 58-71.

- M. Gopalaswamy and S. N. Kumar. Cloud computing technology: A boon for library and information services. *Indian Journal of Library and Information Science*. [Online]. Available:
- M. Mircea and A. I. Andreescu (2011) "Using Cloud Computing in Higher Education: A Strategy to Improve Agili-ty in the Current Financial Crisis", Communications of the IBIMA, vol. 2011, Article ID 875547, (2011), pp. 1-15.
- Malhotra, Y., & Galletta, F. (1999). Extending the technology acceptance model for social influence: theoretical bases and empirical validation. *Proceedings of the 32th ICSS*.
- Marine, Souheil, Jean-Marie Blanchard(2004) Bridging the digital divide: An opportunity for growth for the 21st century. Alcatel telecommunications review; 3: 308-313.
- Mathieson K, (1991) Predicting user intentions: Comparing the technology acceptance model with the theory of planned behaviour, *Information Systems Research*, 2(3) 173-191.
- McEvily, S.K. and Chakravarthy, B. (2002). The Persistence of Knowledge-Based Advantage: An Empirical Test for Product Performance and Technological Knowledge. *Strategic Management Journal 23*(4), 285-305
- Mell, P., & Grance, T. (2011). *The NIST definition of cloud computing (draft)*. National Institute of Standards and Technology
- Meuter, M. L., Bitner, M. J., Ostrom, A. L., & Brown, S. W. (2005). Choosing among alternative service delivery modes: An investigation of customer trial of self-service technologies. *Journal of Marketing*, 69, 61–83.124
- Moon, J. W., & Y. G. Kim, (2001). Extending the TAM for a World Wide Web Context. Information & Management, 38(4), 217-230

- Moore, G. C.; Benbasat. I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. Information Systems Research. 2(3): 192-221.
- Murphy, E. (2005). *Issues in the adoption of broadband &-enabled learning*. British Journal of Educational Technology. 36(3): 525-536.
- N. Sultan, , (2010)Cloud computing for education: A new dawn?", International Journal of Information Management, vol. 30, pp. 109-116.

Nigeria's National IT Policy. 2010. 3 May, 2012 < http://www.nitda.gov.ng>

- Nusca, A. (2012). The future of cloud computing: 9 trends for 2012. Available at http://www.zdnet.com/blog/btl/the-future-of-cloud-computing-9-trends-for-2012/80511
- OECD. (2005). Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data, 3rd Edition. OECD Publishing, Paris
- Oliveira, T. and Martins, M. F. (2011). Literature Review of Information Technology Adoption Models at Firm Level. *The Electronic Journal Information Systems Evaluation*, 14(1), 110-121
- Oliveira, T. and Martins, M. F. (2011). Literature Review of Information Technology Adoption Models at Firm Level. *The Electronic Journal Information Systems Evaluation*, 14(1), 110-121.
- P. Mell and T. Grance (2011). The NIST Definition of Cloud Computing, NIST Special Publication 800-145, http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.
- P. Pocatilu (2010), Cloud Computing Benefits for E-learning Solutions, Oeconomics of Knowledge, vol. 2, no. 1, pp. 9-14.

- P. Pocatilu, F. Alecu and M. Vetrici (2009) Using Cloud Computing for E-learning Systems, Proceedings of the 8th WSEAS international conference on Data networks, communications, computers, November 07-09, pp. 54-59, Baltimore, MD, USA.
- Pan, M., and Jang, W. (2008) Determinants of the adoption of enterprise resource planning within the technology-organization-environment framework: Taiwan's communications *inAastry, The Journal of Computer Information Systems,* 48,3, 94.
- Poon, S., and Swatman, P.M.C. (1999) An exploratory study of small business Internet commerce issues. *Information & Management*, 35, 9-18.
- Porter M. E. (1980). Competitive Strategy: Techniques for Analyzing Industries and Competitors. Free Press: New York.
- Premkumar, G., and Roberts, M. (1999). Adoption of New Information Technologies in Rural Small Businesses. Omega: *The International Journal of Management Science*, 27(4), 467-84
- Premkumar, G., Ramamurthy, K., & Nilakanta, S. (1994). Implementation of electronic data interchange: An innovation diffusion perspective. *Journal of Management Information Systems*, 11, 157-86
- Ramdani, B., Kawalek, P., and Lorenzo, O. (2009). Predicting SMEs' Adoption of Enterprise Systems. *Journal of Enterprise Information Management*, 22(1/2), 10-24

Reuters, A. (2006). IBM Accelerate Push Into 3D Virtual Worlds.

- Rogers, E. M. (1983). Diffusion of Innovations. 3rd Ed., New York: Free Press.
- Rogers, E. (1995). Diffusion of Innovations. 4th Ed... New York, Free Press.

Rogers, E. (2003). *Diffusion of Innovations*. 5th Ed.. New York, Free Press.

Rogers, E. M. (1962). Diffusion of innovations (1st ed.). New York: Free Press.

Rogers, E. M. (1995). Diffusion of Innovations. New York, NY: The Free Press

Rogers, E. M. (2003) "Diffusion of Innovations (5th Edition)," Glencoe: Free Press

Rogers, E. M., and Shoemaker, F. F. (1971). *Communication of Innovations: a Cross Cultural Approach*. New York: The Free Press

Rogers, E.M. (1983), Diffusion of Innovations, (3rd ed.) The Free Press, New York.

Rogers, E.M. (2003), Diffusion of Innovation, (Fifth Edition ed.) Free Press, New York

- Ross, V. W. (2010). Factors influencing the adoption of cloud computing by decisions making managers (Doctoral thesis). Avaiable from ProQuest Dissertations & Theses database. (UMI No. 3391308).
- S. M. Reza. (November 2006). Problem and Prospects of Digital Library Digitization in Bangladesh Institutes of Higher Education. Inflibnet's Publications. [Online]. pp. 106. Available:
- S. Rupesh and K. Gaurav. (July 2011). Cloud computing in digitaland university libraries. Global Journal of Computer Science and Journal%20_GJCST_Vol_11_Issue_12_July.pdf
- Sasikala, S. & Prema, S. (2010). "Massive Centralized Cloud Computing (MCCC) Exploration in Higher Education," *Advances in Computational Sciences and Technology*, 3 (2), 111–118;
- Schiffman, L. G., & Kanuk, L. L. (2007). *Consumer Behavior*, Pearson Education Inc., Upper Saddle River, New Jersey

- Scott, W. R. (2001). Institutions and Organizations. 2. ed. Thousand Oaks, CA, Sage Publications
- Scott, W. R., and Christensen, S. (1995). *The Institutional Construction of Organizations: International and Longitudinal Studies*. Thousand Oaks, CA, Sage Publications
- Sharma, A., Citurs, A., and Konsynski, B. 2007 Strategic and institutional perspectives in the adoption and early integration of radio frequency identification (RFID), Proceedings of the 40th Hawaii International Conference on System Sciences.
- Shin, D. H. (2011). The influence of perceived characteristics of innovating on 4G mobile adoption. *International Journal of Mobile Communications*, 9(3), 261-279
- Soares-Aguiar, A., and Palma-Dos-Reis, A. (2008). Why Do Firms Adopt E-Procurement Systems? Using Logistic Regression to Empirically Test a Conceptual Model. *IEEE Transactions on Engineering Management*, 55(1), 120-133
- Sparling, L. C. A., and Toleman, M. (2007). SME adoption of e-Commerce in the Central Okanagan Region of Canada. 18th Australasian Conference on Information Systems, Toowoomba
- Sultan, F., & Chan, L. (2000). The adoption of new technology: The case of object-oriented computing in software companies. *IEEE Transactions on Engineering Management*, 47(1
- Sultan, N. A. (2011). Reaching for the "cloud": How SMEs can manage. *International Journal of Information Management*, 37(3), 272-278

- Sultan, Nabil. Cloud computing for education: A new dawn?. International Journal of Information Management (2010); 30.2:109-116.
- Sung, J., & Coursaris, C. (2011). Interactivity Effects on the Usefulness, Ease of Use, and Enjoyment of University Mobile Websites. *Paper presented at the 2011 Conference* of the International Communication Association, 26-30, May 2011, Boston, Massachusetts, USA
- Swanson, E. B. (1982). Measuring User Attitudes in MIS Research: a Review. OMEGA International Journal of Management Science, 10(2), 157–65
- Thong, J.Y.L. (1999). An integrated model of information systems adoption in small businesses. Journal of Management Information Systems, 15(4), 187-209
- Thorsteinsson, G., Page, T. & Niculescu, A. (2010). "Using Virtual Reality for Developing Design Communication," *Studies in Informatics and Control*, 19 (1), 93-106
- Tornatzky, L. G., and Klein, K. J. (1982). Innovation Characteristics and Innovation Adoption Implementation: A Meta-Analysis of Findings. *IEEE Transactions on Engineering Management EM*, 29(1), 28-45.
- Tornatzky, L.G., and Fleischer, M. (1990), *The Process of Technological Innovation*, Lexington Books, Lexington, MA.
- Troshani, I. (2011). Exploring the Public Sector Adoption of HRIS. Industrial Management & Data Systems, 111(3), 470 488.

- Tunity Technologies Pte Ltd. (May 5, 2013). E-Library Management System. [Online]. Available: <u>http://www.tunitytech.com/TunityLibraryManagementSystem/ext/e-</u>Library%20Management%20System.pdf
- U. J. Bora and M. Ahmed, (2013). E-Learning using Cloud Computing, International Journal of Science and Mod-ern Engineering, vol. 1, no. 2, pp. 9-12.
- University of Washington, "IT Connect: Cloud Services Frequently Asked Questions", http://www.washington.edu/itconnect/teamwork/cloudfaq.html cloud (accessed on May 2013).
- Vaidya, S. D., and Nandy, M. (2004). The Internet and the Organizational Adoption of Electronic Business: A Research Agenda. The Fourth International Conference on Electronic Business.
- Vishwanath, A., & Goldhaber, G. M. (2003). An examination of the factors contributing to adoption decisions among late-diffused technology products. *New Media & Society*, 5(4), 547-572
- Voas, J., & Zang, J. (2009). Cloud computing: new wine or just new bottle? 7 7(2),25-33.
- Vujin V (2012). Development and implementation of e-education model in a higher education institution. Scientific Research and Essays. 7.13:1432-1443.
- Wang, Y. M., Wang, Y. S., and Yang, Y. F. (2010). Understanding the Determinants of RFID Adoption in the Manufacturing Industry. *Technological Forecasting and Social Change*, 77(2010), 803-815
- Wu, X., & Subramaniam, C. (2009). New Understanding of RFID Adoption and Infusion in Retail Supply Chain. 42nd Hawaii International Conference on System Sciences, (pp. 1-10). Hawaii

- Wyld, D. C. (2009). "Cloud Computing 101: Universities are Migrating to The Cloud for Functionality and Savings," Computer Sight.
- Xu, S., Zhu, K. and Gibbs, J. (2004). Global Technology, Local Adoption: A Cross-Country Investigation of Internet Adoption by Companies in the United States and China. *Electronic Markets 14*(1), 13-24.
- Yousafzai, S. Y., Foxall, G. R., & Pallister, J. G. (2010). Explaining internet banking behavior: theory of reasoned action, theory of planned behavior, or technology acceptance model?. *Journal of applied social psychology*, 40(5), 1172-1202
- Youseff, L., Butrico, M., & Da Silva, D. (2008). Toward a unified ontology of cloud computing. *Grid Computing Environments Workshop* (pp. 1-10). Austin: Institute of Electrical and Electronics Engineers.
- Zhang, C., Cui, L., Huang, L., and Zhang, C. (2007). Exploring the Role of Government in Information Technology Diffusion an Empirical Study of IT Usage in Shanghai Firms, In: T. McMaster, D. Wastell, E. Ferneley, J. DeGross (Eds.), Organizational Dynamics of Technology-Based Innovation: Diversifying the Research Agenda, Springer, Boston.
- Zhang, Q., Cheng Lu, & Boutaba, R. (2010). Cloud computing: state-of-the-art and research challenges. *Journal of Internet Services and Applications*, (1), 7–18
- Zhu, K. and Kraemer, K.L. (2005). Post-Adoption Variations in Usage and Value of E-Business by Organizations: Cross-Country Evidence from the Retail Industry. *Information Systems Research 16*(1), 61-84.

- Zhu, K., Kraemer, K.L. and Xu, S. (2003). E-Business Adoption by European Firms: A Cross-Country Assessment of the Facilitators and Inhibitors. *European Journal of Information Systems* 12(4), 251-268.
- Zhu, K., Kraemer, K.L., Xu, S. and Dedrick, J. (2004). Information Technology Payoff in E-Business Environments: An International Perspective on Value Creation of E-Business in the Financial Services Industry. *Journal of Management Information Systems 21*(1), 17-56.