Volume 4 Issue 2, December 2015

International Journal of Emerging Science and Engineering

ISSN: 2319-6378 (Online)

Website: www.ijese.org





Blue Eyes Intelligence Engineering & Sciences Publication Pvt. Ltd.

Exploring Innovation: A Key for Dedicated Services

Address:

22, First Floor, ShivLoke Phase-IV,

Khajuri Kala, BHEL-Piplani, Bhopal (M.P.)-462021, India

Website: www.blueeyesintelligence.org

Email: director@blueeyesintelligence.org, blueeyes@gmail.com

Cell #: +91-9669981618, WhatsApp #: +91-9669981618, Viber #: +91-9669981618

Skype #: beiesp, Twitter #: beiesp

Editor In Chief

Dr. Shiv K Sahu

Ph.D. (CSE), M.Tech. (IT, Honors), B.Tech. (IT)

Director, Blue Eyes Intelligence Engineering & Sciences Publication Pvt. Ltd., Bhopal(M.P.), India

Dr. Shachi Sahu

Ph.D. (Chemistry), M.Sc. (Organic Chemistry)

Additional Director, Blue Eyes Intelligence Engineering & Sciences Publication Pvt. Ltd., Bhopal(M.P.), India

Vice Editor In Chief

Dr. Vahid Nourani

Professor, Faculty of Civil Engineering, University of Tabriz, Iran

Prof.(Dr.) Anuranjan Misra

Professor & Head, Computer Science & Engineering and Information Technology & Engineering, Noida International University, Noida (U.P.), India

Chief Advisory Board

Prof. (Dr.) Hamid Saremi

Vice Chancellor of Islamic Azad University of Iran, Quchan Branch, Quchan-Iran

Dr. Uma Shanker

Professor & Head, Department of Mathematics, CEC, Bilaspur(C.G.), India

Dr. Rama Shanker

Professor & Head, Department of Statistics, Eritrea Institute of Technology, Asmara, Eritrea

Dr. Vinita Kumari

Blue Eyes Intelligence Engineering & Sciences Publication Pvt. Ltd., India

Dr. Kapil Kumar Bansal

Head (Research and Publication), SRM University, Gaziabad (U.P.), India

Dr. Deepak Garg

Professor, Department of Computer Science and Engineering, Thapar University, Patiala (Punjab), India, Senior Member of IEEE, Secretary of IEEE Computer Society (Delhi Section), Life Member of Computer Society of India (CSI), Indian Society of Technical Education (ISTE), Indian Science Congress Association Kolkata.

Dr. Vijav Anant Athavale

Director of SVS Group of Institutions, Mawana, Meerut (U.P.) India/ U.P. Technical University, India

Dr. T.C. Manjunath

Principal & Professor, HKBK College of Engg, Nagawara, Arabic College Road, Bengaluru-560045, Karnataka, India

Dr. Kosta Yogeshwar Prasad

Director, Technical Campus, Marwadi Education Foundation's Group of Institutions, Rajkot-Morbi Highway, Gauridad, Rajkot, Gujarat, India

Dr. Dinesh Varshney

Director of College Development Counceling, Devi Ahilya University, Indore (M.P.), Professor, School of Physics, Devi Ahilya University, Indore (M.P.), and Regional Director, Madhya Pradesh Bhoj (Open) University, Indore (M.P.), India

Dr. P. Dananjayan

Professor, Department of Department of ECE, Pondicherry Engineering College, Pondicherry, India

Dr. Sadhana Vishwakarma

Associate Professor, Department of Engineering Chemistry, Technocrat Institute of Technology, Bhopal(M.P.), India

Dr. Kamal Mehta

Associate Professor, Deptment of Computer Engineering, Institute of Technology, NIRMA University, Ahmedabad (Gujarat), India

Dr. CheeFai Tan

Faculty of Mechanical Engineering, University Technical, Malaysia Melaka, Malaysia

Dr. Suresh Babu Perli

Professor & Head, Department of Electrical and Electronic Engineering, Narasaraopeta Engineering College, Guntur, A.P., India

Dr. Binod Kumar

Associate Professor, Schhool of Engineering and Computer Technology, Faculty of Integrative Sciences and Technology, Quest International University, Ipoh, Perak, Malaysia

Dr. Chiladze George

Professor, Faculty of Law, Akhaltsikhe State University, Tbilisi University, Georgia

Dr. Kavita Khare

Professor, Department of Electronics & Communication Engineering, MANIT, Bhopal (M.P.), INDIA

Dr. C. Sarayanan

Associate Professor (System Manager) & Head, Computer Center, NIT, Durgapur, W.B. India

Dr. S. Saravanan

Professor, Department of Electrical and Electronics Engineering, Muthayamal Engineering College, Resipuram, Tamilnadu, India

Dr. Amit Kumar Garg

Professor & Head, Department of Electronics and Communication Engineering, Maharishi Markandeshwar University, Mulllana, Ambala (Haryana), India

Dr. T.C.Manjunath

Principal & Professor, HKBK College of Engg, Nagawara, Arabic College Road, Bengaluru-560045, Karnataka, India

Dr. P. Dananjavan

Professor, Department of Department of ECE, Pondicherry Engineering College, Pondicherry, India

Dr. Kamal K Mehta

Associate Professor, Department of Computer Engineering, Institute of Technology, NIRMA University, Ahmedabad (Gujarat), India

Dr. Rajiv Srivastava

Director, Department of Computer Science & Engineering, Sagar Institute of Research & Technology, Bhopal (M.P.), India

Dr. Chakunta Venkata Guru Rao

Professor, Department of Computer Science & Engineering, SR Engineering College, Ananthasagar, Warangal, Andhra Pradesh, India

Dr. Anuranjan Misra

Professor, Department of Computer Science & Engineering, Bhagwant Institute of Technology, NH-24, Jindal Nagar, Ghaziabad, India

Dr. Robert Brian Smith

International Development Assistance Consultant, Department of AEC Consultants Pty Ltd, AEC Consultants Pty Ltd, Macquarie Centre, North Ryde, New South Wales, Australia

Dr. Saber Mohamed Abd-Allah

Associate Professor, Department of Biochemistry, Shanghai Institute of Biochemistry and Cell Biology, Yue Yang Road, Shanghai, China

Dr. Himani Sharma

Professor & Dean, Department of Electronics & Communication Engineering, MLR Institute of Technology, Laxman Reddy Avenue, Dundigal, Hyderabad, India

Dr. Sahab Singh

Associate Professor, Department of Management Studies, Dronacharya Group of Institutions, Knowledge Park-III, Greater Noida, India

Dr. Umesh Kumar

Principal: Govt Women Poly, Ranchi, India

Dr. Syed Zaheer Hasan

Scientist-G Petroleum Research Wing, Gujarat Energy Research and Management Institute, Energy Building, Pandit Deendayal Petroleum University Campus, Raisan, Gandhinagar-382007, Gujarat, India.

Dr. Jaswant Singh Bhomrah

Director, Department of Profit Oriented Technique, 1 – B Crystal Gold, Vijalpore Road, Navsari 396445, Gujarat. India

Technical Advisory Board

Dr. Mohd. Husain

Director MG Institute of Management & Technology, Banthara, Lucknow (U.P.), India

Dr. T. Javanthy

Principal, Panimalar Institute of Technology, Chennai (TN), India

Dr. Umesh A.S.

Director, Technocrats Institute of Technology & Science, Bhopal(M.P.), India

Dr. B. Kanagasabapathi

Infosys Labs, Infosys Limited, Center for Advance Modeling and Simulation, Infosys Labs, Infosys Limited, Electronics City, Bangalore, India

Dr. C.B. Gupta

Professor, Department of Mathematics, Birla Institute of Technology & Sciences, Pilani (Rajasthan), India

Dr. Sunandan Bhunia

Associate Professor & Head,, Dept. of Electronics & Communication Engineering, Haldia Institute of Technology, Haldia, West Bengal, India

Dr. Jaydeb Bhaumik

Associate Professor, Dept. of Electronics & Communication Engineering, Haldia Institute of Technology, Haldia, West Bengal, India

Dr. Rajesh Das

Associate Professor, School of Applied Sciences, Haldia Institute of Technology, Haldia, West Bengal, India

Dr. Mrutyunjaya Panda

Professor & Head, Department of EEE, Gandhi Institute for Technological Development, Bhubaneswar, Odisha, India

Dr. Mohd. Nazri Ismail

Associate Professor, Department of System and Networking, University of Kuala (UniKL), Kuala Lumpur, Malaysia

Dr. Haw Su Cheng

Faculty of Information Technology, Multimedia University (MMU), Jalan Multimedia, 63100 Cyberjaya

Dr. Hossein Rajabalipour Cheshmehgaz

Industrial Modeling and Computing Department, Faculty of Computer Science and Information Systems, Universiti Teknologi Malaysia (UTM) 81310, Skudai, Malaysia

Dr. Sudhinder Singh Chowhan

Associate Professor, Institute of Management and Computer Science, NIMS University, Jaipur (Rajasthan), India

Dr. Neeta Sharma

Professor & Head, Department of Communication Skils, Technocrat Institute of Technology, Bhopal(M.P.), India

Dr. Ashish Rastogi

Associate Professor, Department of CSIT, Guru Ghansi Das University, Bilaspur (C.G.), India

Dr. Santosh Kumar Nanda

Professor, Department of Computer Science and Engineering, Eastern Academy of Science and Technology (EAST), Khurda (Orisa), India

Dr. Hai Shanker Hota

Associate Professor, Department of CSIT, Guru Ghansi Das University, Bilaspur (C.G.), India

Dr. Sunil Kumar Singla

Professor, Department of Electrical and Instrumentation Engineering, Thapar University, Patiala (Punjab), India

Dr. A. K. Verma

Professor, Department of Computer Science and Engineering, Thapar University, Patiala (Punjab), India

Dr. Durgesh Mishra

Chairman, IEEE Computer Society Chapter Bombay Section, Chairman IEEE MP Subsection, Professor & Dean (R&D), Acropolis Institute of Technology, Indore (M.P.), India

Dr. Xiaoguang Yue

Associate Professor, College of Computer and Information, Southwest Forestry University, Kunming (Yunnan), China

Dr. Veronica Mc Gowan

Associate Professor, Department of Computer and Business Information Systems, Delaware Valley College, Doylestown, PA, Allman China

Dr. Mohd. Ali Hussain

Professor, Department of Computer Science and Engineering, Sri Sai Madhavi Institute of Science & Technology, Rajahmundry (A.P.), India

Dr. Mohd. Nazri Ismail

Professor, System and Networking Department, Jalan Sultan Ismail, Kaula Lumpur, MALAYSIA

Dr. Sunil Mishra

Associate Professor, Department of Communication Skills (English), Dronacharya College of Engineering, Farrukhnagar, Gurgaon (Harvana), India

Dr. Labib Francis Gergis Rofaiel

Associate Professor, Department of Digital Communications and Electronics, Misr Academy for Engineering and Technology, Mansoura City, Egypt

Dr. Pavol Tanuska

Associate Professor, Department of Applied Informetics, Automation, and Mathematics, Trnava, Slovakia

Dr. VS Giridhar Akula

Professor, Avanthi's Research & Technological Academy, Gunthapally, Hyderabad, Andhra Pradesh, India

Dr. S. Satyanarayana

Associate Professor, Department of Computer Science and Engineering, KL University, Guntur, Andhra Pradesh, India

Dr. Bhupendra Kumar Sharma

Associate Professor, Department of Mathematics, KL University, BITS, Pilani, India

Dr. Praveen Agarwal

Associate Professor & Head, Department of Mathematics, Anand International College of Engineering, Jaipur (Rajasthan), India

Dr. Manoj Kumar

Professor, Department of Mathematics, Rashtriya Kishan Post Graduate Degree, College, Shamli, Prabudh Nagar, (U.P.), India

Dr. Shaikh Abdul Hannan

Associate Professor, Department of Computer Science, Vivekanand Arts Sardar Dalipsing Arts and Science College, Aurangabad (Maharashtra), India

Dr. K.M. Pandey

Professor, Department of Mechanical Engineering, National Institute of Technology, Silchar, India

Prof. Pranav Parashar

Technical Advisor, International Journal of Soft Computing and Engineering (IJSCE), Bhopal (M.P.), India

Dr. Biswajit Chakraborty

MECON Limited, Research and Development Division (A Govt. of India Enterprise), Ranchi-834002, Jharkhand, India

Dr. D.V. Ashoka

Professor & Head, Department of Information Science & Engineering, SJB Institute of Technology, Kengeri, Bangalore, India

Dr. Sasidhar Babu Suvanam

Professor & Academic Cordinator, Department of Computer Science & Engineering, Sree Narayana Gurukulam College of Engineering, Kadayiuruppu, Kolenchery, Kerala, India

Dr. C. Venkatesh

Professor & Dean, Faculty of Engineering, EBET Group of Institutions, Kangayam, Erode, Caimbatore (Tamil Nadu), India

Dr. Nilay Khare

Assoc. Professor & Head, Department of Computer Science, MANIT, Bhopal (M.P.), India

Dr. Sandra De Iaco

Professor, Dip.to Di Scienze Dell'Economia-Sez. Matematico-Statistica, Italy

Dr. Yaduvir Singh

Associate Professor, Department of Computer Science & Engineering, Ideal Institute of Technology, Govindpuram Ghaziabad, Lucknow (U.P.), India

Dr. Angela Amphawan

Head of Optical Technology, School of Computing, School Of Computing, Universiti Utara Malaysia, 06010 Sintok, Kedah, Malaysia

Dr. Ashwini Kumar Arya

Associate Professor, Department of Electronics & Communication Engineering, Faculty of Engineering and Technology, Graphic Era University, Dehradun (U.K.), India

Dr. Yash Pal Singh

Professor, Department of Electronics & Communication Engg, Director, KLS Institute Of Engg. & Technology, Director, KLSIET, Chandok, Bijnor, (U.P.), India

Dr. Ashish Jain

Associate Professor, Department of Computer Science & Engineering, Accurate Institute of Management & Technology, Gr. Noida (U.P.), India

Dr. Abhay Saxena

Associate Professor & Head, Department of Computer Science, Dev Sanskriti University, Haridwar, Uttrakhand, India

Dr. Judy. M.V

Associate Professor, Head of the Department CS &IT, Amrita School of Arts and Sciences, Amrita Vishwa Vidyapeetham, Brahmasthanam, Edapally, Cochin, Kerala, India

Dr. Sangkyun Kim

Professor, Department of Industrial Engineering, Kangwon National University, Hyoja 2 dong, Chunche0nsi, Gangwondo, Korea

Dr. Sanjay M. Gulhane

Professor, Department of Electronics & Telecommunication Engineering, Jawaharlal Darda Institute of Engineering & Technology, Yavatmal, Maharastra, India

Dr. K.K. Thyagharajan

Principal & Professor, Department of Informational Technology, RMK College of Engineering & Technology, RSM Nagar, Thiruyallur, Tamil Nadu, India

Dr. P. Subashini

Assoc. Professor, Department of Computer Science, Coimbatore, India

Dr. G. Srinivasrao

Professor, Department of Mechanical Engineering, RVR & JC, College of Engineering, Chowdavaram, Guntur, India

Dr. Rajesh Verma

Professor, Department of Computer Science & Engg. and Deptt. of Information Technology, Kurukshetra Institute of Technology & Management, Bhor Sadian, Pehowa, Kurukshetra (Haryana), India

Dr. Pawan Kumar Shukla

Associate Professor, Satya College of Engineering & Technology, Haryana, India

Dr. U C Srivastava

Associate Professor, Department of Applied Physics, Amity Institute of Applied Sciences, Amity University, Noida, India

Dr. Reena Dadhich

Prof. & Head, Department of Computer Science and Informatics, MBS MArg, Near Kabir Circle, University of Kota, Rajasthan, India

Dr. Aashis. S. Roy

Department of Materials Engineering, Indian Institute of Science, Bangalore Karnataka, India

Dr. Sudhir Nigam

Professor Department of Civil Engineering, Principal, Lakshmi Narain College of Technology and Science, Raisen, Road, Bhopal, (M.P.), India

Dr. S. Senthil Kumar

Doctorate, Department of Center for Advanced Image and Information Technology, Division of Computer Science and Engineering, Graduate School of Electronics and Information Engineering, Chon Buk National University Deok Jin-Dong, Jeonju, Chon Buk, 561-756, South Korea Tamilnadu, India

Dr. Gufran Ahmad Ansari

Associate Professor, Department of Information Technology, College of Computer, Qassim University, Al-Qassim, Kingdom of Saudi Arabia (KSA)

Dr. R. Navaneetha krishnan

Associate Professor, Department of MCA, Bharathiyar College of Engg & Tech, Karaikal Puducherry, India

Dr. Hossein Rajabalipour Cheshmejgaz

Industrial Modeling and Computing Department, Faculty of Computer Science and Information Systems, Universiti Teknologi Skudai, Malaysia

Dr. Veronica McGowan

Associate Professor, Department of Computer and Business Information Systems, Delaware Valley College, Doylestown, PA, Allman China

Dr. Sanjay Sharma

Associate Professor, Department of Mathematics, Bhilai Institute of Technology, Durg, Chhattisgarh, India

Dr. Taghreed Hashim Al-Noor

Professor, Department of Chemistry, Ibn-Al-Haitham Education for pure Science College, University of Baghdad, Iraq

Dr. Madhumita Dash

Professor, Department of Electronics & Telecommunication, Orissa Engineering College, Bhubaneswar, Odisha, India

Dr. Anita Sagadevan Ethiraj

Associate Professor, Department of Centre for Nanotechnology Research (CNR), School of Electronics Engineering (Sense), Vellore Institute of Technology (VIT) University, Tamilnadu, India

Dr. Sibasis Acharya

Project Consultant, Department of Metallurgy & Mineral Processing, Midas Tech International, 30 Mukin Street, Jindalee-4074, Queensland, Australia

Dr. Neelam Ruhil

Professor, Department of Electronics & Computer Engineering, Dronacharya College of Engineering, Gurgaon, Haryana, India

Dr. Faizullah Mahar

Professor, Department of Electrical Engineering, Balochistan University of Engineering and Technology, Pakistan

FING

Dr. K. Selvaraju

Head, PG & Research, Department of Physics, Kandaswami Kandars College (Govt. Aided), Velur (PO), Namakkal DT. Tamil Nadu, India

Dr. M. K. Bhanarkar

Associate Professor, Department of Electronics, Shivaji University, Kolhapur, Maharashtra, India

Dr. Sanjay Hari Sawant

Professor, Department of Mechanical Engineering, Dr. J. J. Magdum College of Engineering, Jaysingpur, India

Dr. Arindam Ghosal

Professor, Department of Mechanical Engineering, Dronacharya Group of Institutions, B-27, Part-III, Knowledge Park, Greater Noida, India

Dr. M. Chithirai Pon Selvan

Associate Professor, Department of Mechanical Engineering, School of Engineering & Information Technology Manipal University, Dubai, UAE

Dr. S. Sambhu Prasad

Professor & Principal, Department of Mechanical Engineering, Pragati College of Engineering, Andhra Pradesh, India.

Dr. Muhammad Attique Khan Shahid

Professor of Physics & Chairman, Department of Physics, Advisor (SAAP) at Government Post Graduate College of Science, Faisalabad.

Dr. Kuldeep Pareta

Professor & Head, Department of Remote Sensing/GIS & NRM, B-30 Kailash Colony, New Delhi 110 048, India

Dr. Th. Kiranbala Devi

Associate Professor, Department of Civil Engineering, Manipur Institute of Technology, Takyelpat, Imphal, Manipur, India

Dr. Nirmala Mungamuru

Associate Professor, Department of Computing, School of Engineering, Adama Science and Technology University, Ethiopia

Dr. Srilalitha Giriia Kumari Sagi

Associate Professor, Department of Management, Gandhi Institute of Technology and Management, India

Dr. Vishnu Narayan Mishra

Associate Professor, Department of Mathematics, Sardar Vallabhbhai National Institute of Technology, Ichchhanath Mahadev Dumas Road, Surat (Gujarat), India

Dr. Yash Pal Singh

Director/Principal, Somany (P.G.) Institute of Technology & Management, Garhi Bolni Road, Rewari Haryana, India.

Dr. Sripada Rama Sree

Vice Principal, Associate Professor, Department of Computer Science and Engineering, Aditya Engineering College, Surampalem, Andhra Pradesh. India.

Dr. Rustom Mamlook

Associate Professor, Department of Electrical and Computer Engineering, Dhofar University, Salalah, Oman. Middle East.

Managing Editor

Mr. Jitendra Kumar Sen

International Journal of Emerging Science and Engineering (IJESE)

Editorial Board

Dr. Saeed Balochian

Associate Professor, Gonaabad Branch, Islamic Azad University, Gonabad, Iratan

Dr. Mongey Ram

Associate Professor, Department of Mathematics, Graphics Era University, Dehradun, India

Dr. Arupratan Santra

Sr. Project Manager, Infosys Technologies Ltd, Hyderabad (A.P.)-500005, India

Dr. Ashish Jolly

Dean, Department of Computer Applications, Guru Nanak Khalsa Institute & Management Studies, Yamuna Nagar (Haryana), India

Dr. Israel Gonzalez Carrasco

Associate Professor, Department of Computer Science, Universidad Carlos III de Madrid, Leganes, Madrid, Spain

Dr. Guoxiang Liu

Member of IEEE, University of North Dakota, Grand Froks, N.D., USA

Dr. Khushali Menaria

Associate Professor, Department of Bio-Informatics, Maulana Azad National Institute of Technology (MANIT), Bhopal (M.P.), India

Dr. R. Sukumar

Professor, Sethu Institute of Technology, Pulloor, Kariapatti, Virudhunagar, Tamilnadu, India

Dr. Cherouat Abel

Professor, University of Technology of Troyes, France

Dr. Rinkle Aggrawal

Associate Professor, Department of Computer Science and Engineering, Thapar University, Patiala (Punjab), India

Dr. Parteek Bhatia

Associate Professor, Deprtment of Computer Science & Engineering, Thapar University, Patiala (Punjab), India

Dr. Manish Srivastava

Professor & Head, Computer Science and Engineering, Guru Ghasidas Central University, Bilaspur (C.G.), India

Dr. B. P. Ladgaonkar

Assoc. Professor&Head, Department of Electronics, Shankarrao Mohite Mahavidyalaya, Akluj, Maharashtra, India

Dr. E. Mohan

Professor & Head, Department of Computer Science and Engineering, Pallavan College of Engineering, Kanchipuram, Tamilnadu, India

Dr. M. Shanmuga Ptriva

Assoc. Professor, Department of Biotechnology, MVJ College of Engineering, Bangalore Karnataka, India

Dr. Leena Jain

Assoc. Professor & Head, Dept. of Computer Applications, Global Institute of Management & Emerging Technologies, Amritsar, India

Dr. S.S.S.V Gopala Raju

Professor, Department of Civil Engineering, GITAM School of Technology, GITAM, University, Hyderabad, Andhra Pradesh, India

Dr. Ani Grubisic

Department of Computer Science, Teslina 12, 21000 split, Croatia

Dr. Ashish Paul

Associate Professor, Department of Basic Sciences (Mathematics), Assam Don Bosco University, Guwahati, India

Dr. Sivakumar Durairaj

Professor, Department of Civil Engineering, Vel Tech High Tech Dr.Rangarajan Dr.Sakunthala Engineering College, Avadi, Chennai Tamil Nadu, India

Dr. Rashmi Nigam

Associate Professor, Department of Applied Mathematics, UTI, RGPV, Airport Road, Bhopal, (M.P.), India

Dr. Mu-Song Chen

Associate Professor, Department of Electrical Engineering, Da-Yeh University, Rd., Dacun, Changhua 51591, Taiwan R.O.C., Taiwan, Republic of China

Dr. Ramesh S

Associate Professor, Department of Electronics & Communication Engineering, Dr. Ambedkar Institute of Technology, Bangalore, India

Dr. Nor Hayati Abdul Hamid

Associate Professor, Department of Civil Engineering, Universiti Teknologi Mara, Selangor, Malaysia

Dr. C.Nagarajan

Professor & Head, Department of Electrical & Electronic Engineering Muthayammal Engineering College, Rasipuram, Tamilnadu, India

Dr. Ilaria Cacciotti

Department of Industrial Engineering, University of Rome Tor Vergata Via del Politecnico Rome-Italy

Dr. V.Balaji

Principal Cum Professor, Department of EEE &E&I, Lord Ayyappa Institute of Engg & Tech, Uthukadu, Walajabad, Kanchipuram, Tamil Nadu, India

Dr. G. Anjan Babu

Assoc. Professor, Department of Computer Science, S V University, Tirupati, Andhra Pradesh, India

Dr. Damodar Reddy Edla

Assoc. Professor, Department of Computer Science & Engineering, National Institute of Technology, Goa, India

Dr. D.Arumuga Perumal

Professor, Department of Mechanical Engg, Noorul Islam University, Kanyakumari (Dist), Tamilnadu, India

Dr. Roshdy A. AbdelRassoul

Professor, Department of Electronics and Communications Engineering, Arab Academy for Science and Technology, Electronics and Communications Engineering Dept., POBox 1029, Abu-Qir, Alexandria, Egypt

Dr. Aniruddha Bhattacharya

Assoc. Professor & Head, Department of Computer Science & Engineering, Amrita School of Engineering, Bangalore, India

Dr. P Venkateswara Rao

Professor, Department of Mechanical Engineering, KITS, Warangal, Andhra Pradesh, India

Dr. V.Mahalakshmi M.L

Assoc. Professor & Head, Institute of Management Studies, Chennai CID Quarters, V.K.Iyer Road, Mandaveli, Chennai

S.	
N	0

1.

Volume-4 Issue-2, December 2015, ISSN: 2319-6378 (Online)

Published By: Blue Eyes Intelligence Engineering & Sciences Publication Pvt. Ltd.

Page No.

Authors:	Nuraddeen Usman Miko, Hasnah Kamardin
Paper Title:	Corporate Governance and Financial Reporting Quality in Nigeria: Evidence from Pre- and Post-Code 2011

Abstract: Corporate failure has been the issue of discussion in the business environment for a long time Corporate laws, policies and guidelines have been introduced several times to complement or abolish another in some cases. In the case of Nigeria, SEC corporate governance code was introduced in 2003 and replaced with another in 2011. This study aims at finding out the effect of corporate governance code 2011 in the pre- (2009-2010) and post- (2012-2013) periods based on 20 of listed Nigerian consumer goods industry as sample. The study concludes that corporate governance mechanism encouraged earnings management in the pre- period while significantly reduced earnings management in the post- period. The study recommends periodic review of corporate governance code for more efficiency of the code.

Keywords: Corporate governance, board diversity, earnings management, pre- and post- code 2011, Nigeria

References:

- 1. Abbott, L. J., Parker, S., Peters, G. F., & Raghunandan, K. (2003). The Association between Audit Committee Characteristics and Audit Fees. AUDITING: A Journal of Practice & Theory, 22(2), 17–32. doi:10.2308/aud.2003.22.2.17
- 2. Abdullah, S., & Nasir, N. (2004). Accrual management and the independence of the boards of directors and audit committees. Journal of Economics and Management. Retrieved from http://www.iium.edu.my/enmjournal/index.php/enmj/article/view/97
- 3. Ajibolade, S. (2008). A survey of the perception of Ethical Behaviour of future Nigerian Accounting Professionals. The Nigerian Accountant.

 Retrieved from http://scholar.google.com.my/scholar?hl=en&q=A+Survey+of+the+Perception+of+Ethical+Behaviour+of+Futur
- e+Nigerian+Accounting+Professionals&btnG=&as_sdt=1,5&as_sdtp=#0
- 5. Bolton, B. (2014). Audit committee performance: Ownership vs independence Did SOX get it wrong?, 54, 83–112.
- Bryan, D., Liu, C., & Tiras, S. (2004). The influence of independent and effective audit committees on earnings quality. Available at SSRN 488082. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=488082
- 7. Bushee, B. J. (2001). Do institutional investors prefer near-term earnings over long-run value. Contemporary Accounting Research, 18(2), 207–46
- 8. Carcello, J. V, & Neal, T. L. (2000). Audit committee auditor composition and reporting. The Accounting Review, 75(4), 453-467.
- 2. Charitou, A., Lambertides, N., & Trigeorgis, L. (2007). Earnings behaviour of financially distressed firms: The role of institutional ownership. Abacus, 43(3), 271–296. doi:10.1111/j.1467-6281.2007.00230.x
- 10. Cohen, D. A., & Zarowin, P. (2010). Accrual-based and real earnings management activities around seasoned equity offerings. Journal of Accounting and Economics, 50(1), 2–19. doi:10.1016/j.jacceco.2010.01.002
- 11. Dechow, P., Ge, W., & Schrand, C. (2010). Understanding earnings quality: A review of the proxies, their determinants and their consequences. Journal of Accounting and Economics, 50(2-3), 344–401. doi:10.1016/j.jacceco.2010.09.001
- 12. Dechow, P. M., & Dichev, I. D. (2002). The quality of accruals and earnings: The role of accrual estimation errors. The Accounting Review, 77(s-1), 35–59. doi:10.2308/accr.2002.77.s-1.35
- 13. Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1995). Detecting earnings management. The Accounting Review, 70, 193-225.
- DeFond, M. L., & Jiambalvo, J. (1994). Debt covenant violation and manipulation of accruals. Journal of Accounting and Economics, 17(1-2), 145–176. doi:10.1016/0165-4101(94)90008-6
- 15. Demaki, G. O. (2011). Proliferation of codes of corporate governance in Nigeria and economic development. Business and Management Review, 1(6), 1–7.
- Dichev, I. D., & Skinner, D. J. (2002). Large-sample evidence on the debt covenant hypothesis. Journal of Accounting Research, 40, 1091– 1123. doi:10.1111/1475-679X.00083
- 17. Fodio, M. I., Ibikunle, J., & Oba, V. C. (2013). Corporate governance mechanisms and reported earnings quality in listed Nigerian insurance firms. International Journal of Finance and Accounting, 2(5), 279–286. doi:10.5923/j.ijfa.20130205.01
- 18. FRCN Code. (2013). Financial Reporting Council of Nigeria Code.
- Ghosh, A., Marra, A., & Moon, D. (2010). Corporate boards, audit committees, and earnings management: pre- and post-SOX evidence. Journal of Business Finance & Accounting, 37(9-10), 1145–1176. doi:10.1111/j.1468-5957.2010.02218.x
- 20. Healy, P. M., & Wahlen, J. M. (1999). A review of the earnings management literature and its implications for standard setting. Accounting Horizons, 13(4), 365–383. doi:10.2308/acch.1999.13.4.365
- 21. Hsu, G. C. M., & Koh, P. S. (2005). Does the presence of institutional investors influence accruals management? Evidence from Australia. Corporate Governance: An International Review, 13(6), 809–823. doi:10.1111/j.1467-8683.2005.00472.x
- 22. Hunton, J. E., Libby, R., & Mazza, C. L. (2006). Financial reporting transparency and earnings management. The Accounting Review, 81(1), 135–157.
- 23. Hunton, J. E., & Rose, J. M. (2012). Will corporate directors engage in bias arbitrage to curry favor with shareholders? Journal of Accounting and Public Policy, 31(4), 432–447. doi:10.1016/j.jaccpubpol.2011.10.003
- 24. Hutchinson, M. R., Percy, M., & Erkurtoglu, L. (2008). An investigation of the association between corporate governance, earnings management and the effect of governance reforms. Accounting Research Journal, 21(3), 239–262. doi:10.1108/10309610810922495
- 25. Jaggi, B., Leung, S., & Gul, F. (2009). Family control, board independence and earnings management: Evidence based on Hong Kong firms. Journal of Accounting and Public Policy, 28(4), 281–300. doi:10.1016/j.jaccpubpol.2009.06.002
- 26. Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: managerial behavior, agency costs and ownership structure. Journal of Financial Economics, 3(4), 305–360. doi:10.1016/0304-405X(76)90026-X
- 27. Klein, A. (2002). Audit committee, board of director characteristics, and earnings management. Journal of Accounting and Economics, 33(3), 375–400. doi:10.1016/S0165-4101(02)00059-9
- Koh, P. S. (2003). On the association between institutional ownership and aggressive corporate earnings management in Australia. The British Accounting Review, 35(2), 105–128. doi:10.1016/S0890-8389(03)00014-3
 Marrie A. Marriela, P. & Proposition A. (2011). Poored monitoring and commings management are and past IEEE. The International Journal
- Marra, A., Mazzola, P., & Prencipe, A. (2011). Board monitoring and earnings management pre- and post-IFRS. The International Journal of Accounting, 46(2), 205–230. doi:10.1016/j.intacc.2011.04.007
 Mitra, S., & Rodrigue, J. (2002). Discretionary accounting accruals: A methodological issue in earnings management research. Journal of
- Forensic Accounting, 3(2), 188–206.
- 31. Monks, A., & Minow, N. (2004). Corporate Governance (3rd editio.). Blackwell Publishing.
- 32. Musa, F. I., Oloruntoba, F. O., & Oba, V. C. (2014). Examination of the relationship between audit committee characteristics and financial reporting quality of Nigerian deposit banks. EuroEconomica, 33(1), 1582–8859.
- 33. Njanike, K., Dube, T., & Mashayanye, E. (2009). The effectiveness of forensic auditing in detecting, investigating, and preventing bank frauds. Journal of Sustainable Development in Africa, 10(4), 405–425.

1-7

- Okike, E. N. M. (2007). Corporate governance in Nigeria: the status quo. Corporate Governance: An International Review, 15(2), 173-193. doi:10.1111/j.1467-8683.2007.00553.x
- Osma, B. G., & Noguer, B. G. de A. (2007). The effect of the board composition and its monitoring committees on earnings management: 35. Evidence from Spain. Corporate Governance: An International Review, 15(6), 1413–1428. doi:10.1111/j.1467-8683.2007.00654.x Peasnell, K. V., Pope, P. F., & Young, S. (2005). Board monitoring and earnings management: Do outside directors influence abnormal accruals? Journal of Business Finance & Accounting, 32, 1311-1346.
- Rahman, R. A., & Ali, F. H. M. (2006). Board, audit committee, culture and earnings management: Malaysian evidence. Managerial
- Auditing Journal, 21(7), 783–804. doi:10.1108/02686900610680549

 Rose, J. M., Mazza, C. R., Norman, C. S., & Rose, A. M. (2013). The influence of director stock ownership and board discussion 37. transparency on financial reporting quality. Accounting, Organizations and Society, 38(5), 397-405. doi:10.1016/j.aos.2013.07.003
- 38 Saleh, N. M., & Iskandar, T. M. (2005). Earnings management and board characteristics: Evidence from Malaysia, 24, 77-103.
- SEC Code. (2011). Corporate Governance Code. Nigeria.
- Siregar, S. V., & Utama, S. (2008). Type of earnings management and the effect of ownership structure, firm size, and corporategovernance practices: Evidence from Indonesia. The International Journal of Accounting, 43(1), 1-27. doi:10.1016/j.intacc.2008.01.001
- 41 Tricker, B. (2012). Corporate Governance Principles, Policies and Practices (Second Edi.). UK: Oxford University Press.
- 42. Vafeas, N. (2005). Audit committees, boards, and the quality of reported earnings, 22, 1093-1122.
- Xie, B., Davidson, W. N., & DaDalt, P. J. (2003). Earnings management and corporate governance: The role of the board and the audit committee. Journal of Corporate Finance, 9(3), 295-316. doi:10.1016/S0929-1199(02)00006-8
- Yu, F. (2008). Corporate governance and earnings management. Journal of Financial Economic, 88(245-334).

Authors: Parveen Sadotra, M. Y. Kichloo Paper Title: Jurisdiction: An Issue in E-Commerce

Abstract: Enormous flexibility of the Internet has made possible what is popularly called "e-commerce" which has made inroads in the traditional methods of business management. All the facets of the business transaction with which we are accustomed in physical environment can be now executed over the Internet including, on-line advertising, on-line ordering, publishing, banking, investment, auction, and professional services. In discussing these aspects of the internet's role a distinction can be drawn between three forms of transaction. In the first category, as epitomized by the on-line sale of books, Internet businesses allow contracts of sale to be entered into electronically, with the goods involved being delivered using traditional mechanisms. Internet facilitating e-commerce has besides, great advantages; posed many threats because of its being what is popularly called "faceless and borderless". For instance, sending an e-mail message (offer here) does not require disclosure of the identity any more, e-mail message being like an open post card can be intercepted at any place on line, modified, altered, changed and been made to appear to have come from a person other than the actual sender and what is worst, recipient cannot detect it. Thus, securing issues like Authentication, Confidentiality, Integrity, and Non-repudiation etc have been answered. In order to elucidate the security concern, a separate chapter has been made in this work to discuss the same.

Keywords: Cyberspace, E-Commerce, Information Technology, Internet, Jurisdiction

References:

E-commerce Survey, the Economist, Feb, 26, 2000, p.16.

A Lawack, "Electronic Payment via the Internet in the Netherlands' the EDI Law Review", 5: 85-11, 1998.

Allan M.Gahtam, et al, Internet Law, Practical Guide for Legal and Business Professional, England: Thomson Professional Publishing,

Dr. K.V. S. Sarma 'Law Relating to contracts through Internet', edited by Ranbiv Singh and Ghanshan Singh "Cyber Space and the law issues and challenges", Hyderbad: Nalsar University, p. 274-281.

Gray P, Schneider & James T Perry, "Electronic Commerce", Cambridge, Course Technology, 2000, p. 341

- Bhakta Datsal et.al, E-Commerce to M-Commerce; A Quantum leap in Technology-An Introduction to legal Issues arising out of M-Commerce, Chartered Secretary, August 2000, p. 997
- 7. Ankit Majmumdar, "Jurisdiction and the internet; edited by Nandan Kamat, the law relating to computer, Internet and E-Commerce, A guide to cyber laws, New Delhi: Universal Law Publishing, 2000, p. 19
- David R. Johnson and David Post, "Law & Borders The Rise of Law in Cyberspace", Stan Ford Law Review, vol 48, 1996, p. 1357.
- David Post, Anarchy, State and the Internet; An Essay on Law-Making in cyberspace, J. online L. art 3, para, 36, 1995,
- Anne Wells Brainscomb, "Anonymity, Autonomy and Accountability: Challenges to the First Amendment to Cyberspace", Yale L. J, vol 104, 1995, p. 1639.
- David Thatch, "Personnel Jurisdiction and the World Wide Web: Bits (And bytes) of Minimum contracts", Retgers Computer and Technology Law Journal vol 23 1997, p. 152.
- Nandlal, Code of Civil Procedure Code vol (1), 2nd ed, Delhi: Deep and Deep Publications, 1980, p. 659-676
- Nigetl Foster, Developments in German Cyber Law, Communications Law, vol. 5, No. 1, 2000. at p. 12
- Graeme King, "E-Commerce Disputes"; Communication Law, vol 5, No. 1, 2000 at p.16.

 Marcelo Halpem and Ajay K. Mehrotra, "The Tangled web of E-commerce: Identifying the legal Risks of online marketing", The Computer Lawyer vol 17, No. 2, Feb. 2000 at p. 9.

Authors: P. Ravinder Kumar, Archena, Subhash S Kulkarni, Sandeep.V.M

Paper Title: Effect of Sensing Time on Performance of OFDM Based Opportunistic Cognitive Radio

The increased demand on wireless communications results in spectrum congestion that cannot be solved by the static spectrum allocation. In this regard, we propose Cognitive Radio (CR) with Orthogonal Frequency Division Multiplexing (OFDM) technology. OFDM increases the data rate and CR improves the spectrum utilization opportunistically, which is usually underutilized, to the unlicensed users called cognitive users.

Keywords: Birth rate, Death rate, Efficiency, Sensing time, Transmission loss, Transmission interference.

12-16

8-11

- Won-Yeol Lee and Ian. F. Akyildiz, "Optimal Spectrum Sensing Framework for Cognitive Radio Networks, IEEE Transactions On Wireless Communications, Vol. 7(10), 3845-3857, 2008.
- Luca Bixio, Marina Ottonello, Mirco Raffetto, and Carlo S.Regazzoni," Comparison among Cognitive Radio Architectures for Spectrum Sensing". EURASIP Journal on Wireless Communications and Networking, Volume 2011.
- Waleed Ejaz, Najam ul Hasan, Seok Lee and Hyung Seok Kim," Intelligent spectrum sensing scheme for cognitive radio networks".

2.

3.

- EURASIP Journal on wireless communications and Networking 2013.
- 4. Taewon Hwang, Chenyang Yang, Senior Member, IEEE, Gang Wu, Member, IEEE, Shaoqian Li, and Geoffrey Ye Li, Fellow, IEEE, "OFDM and Its Wireless Applications: A Survey", IEEE Transactions on Vehicular Technology, Vol. 58, No. 4, May 2009.
- 5. Luca Rugini, Member, IEEE, and Paolo Banelli, Member, IEEE, "BER of OFDM Systems Impaired by Carrier Frequency Offset in Multiparts Fading Channels". IEEE Transactions On Wireless Communications, Vol. 4, No. 5, September 2005.
- Multipath Fading Channels", IEEE Transactions On Wireless Communications, Vol. 4, No. 5, September 2005.
 S. H. Song, M. O. Hasna, Member, IEEE, and K. B. Letaief, "Prior Zero Forcing for Cognitive Relaying", IEEE Transactions On Wireless Communications, Vol. 12(2), 938-947, 2013
- 7. Sami M. Alamal Fouth, and Gordon L. Stuber, "Joint Spectrum Sensing and Power Control in Cognitive Radio Networks: A Stochastic Approach," IEEE Transactions On Wireless Communications, vol. 11(12), 4372-4380, 2012.
- 8. Hanna Bogucka, Alexander M. Wyglinski, Srikankth Pagadari, and Adrian Kliks, "Spectrally Agile multicarrier Waveforms for Opportunistic Wireless Access", IEEE Communications Magazine, 108-115, June 2011.

Authors: K. Raghavan, M. Kannan

Paper Title:

Software Testing Estimation using Test Scenarios and Weight age Factor

Abstract: Software testing is an important role in software development life cycle [SDLC]. In order to deliver defect free software to the customer, time lines are a key factor for software testing to ensure quality testing. Hence estimation of software testing is an important factor to test the software within the time frame in software projects. In today's software projects, estimations can be performed in many ways like function-points, COOCO model, and Use case Test point. This research work is going to illustrate about, how testing estimation can be derived based on requirements and weightage factors like simple, medium, complex against each test scenario, which include test planning and test estimation for a given release. The proposed model will be very useful for estimating the time efforts against each requirement within short duration. This model can be modify based on previous release data's to calculate the testing effort estimation in more active approach.

Keywords: Software testing, Estimation, Software project, Requirements, Weightage factor

References:

4.

- 1. Jyoti G. Borade and Vikas R. Khalkar, "Software Project Effort and Cost Estimation Techniques", International Journal of Advanced Research in Computer Science and Software Engineering, ISSN: 2277 128X, August 2013.
- . Rashmi Popli and Naresh Chauhan, "An Agile Software Estimation Technique Based on Regression Testing Efforts", 13th Annual International Software Testing Conference in India, 04 05 December 2013, Bangalore, India.
- 3. RoyClem, "Project Estimation with Use Case Points", http://www.codeproject.com/Articles/9913/Project-Estimation-with-Use-Case-Points, 2005.
- 4. Adeshkumarand Vikas Beniwal , "Test Effort Estimation With & Without Stub And Driver Using Test Point Analysis (TPA)" , International Journal of Engineering Research & Technology (IJERT) , ISSN: 2278-0181 , Vol. 1 Issue 7, September 2012 .
- 5. Kamala Ramasubramani Jayakumar and Alain Abran, "A Survey of Software Test Estimation Techniques", Journal of Software Engineering and Applications, October 2013.
- 6. MuraliChemuturi, "Software Estimation: Best Practices, Tools and Techniques", publisher J.Ross Publishing, Inc, USA, ISBN 978-1-60427-024-2, Pages=298,2009.
- WasifAfzal, "Metrics in Software Test Planning and Test Design Processes", School of Engineering, Blekinge Institute of Technology, Box 520, SE – 372 25, Ronneby, Sweden, MSE-2007:02, January 2007.
- 8. Ashish Sharma and Dharmender Singh Kushwaha, "Applying requirement based complexity for the estimation of software development and testing effort", Department of Computer Engineering & App., GLA University, Mathura, India.
- Priya Chaudhary and C.S. Yadav "Optimizing Test Effort Estimation-A Comparative Analysis", International Journal of Scientific Research Engineering & Technology (IJSRET), Volume 1 Issue2 pp 018-020, ISSN 2278 – 0882, May 2012.
- 10. Shaik Nafeez Umar, "Software testing effort estimation with cobb-douglas function a practical application", ISSN: 2319-1163, May-2013.
- Seyed Morteza Hosseini, "A Model for Determining the Cost of Test Case Execution (or Test Execution Effort Estimation Model)", School of Innovation, Design and Engineering, April 2014.

Authors: Ilhem Hawachi, Habib Sammouda

Paper Title:

Numerical Study of the Mechanical Behavior of Polymer Concrete

Abstract: Polymer concrete (PC) represent a good alternative to traditional cementitious materials in the field of new building construction. In fact, PCs exhibit high compressive strength and ultimate compressive strain values, as well as good chemical resistance. Within the context of these benefits, in this paper we present a study on the mechanical behavior of polymer concrete. Here we propose to use the principles of homogenization to simulate the behavior of organic matrix concrete for different type of geometry of the aggregates and for the case reinforced with fibers. Compressive testing of the PC is firstly carried out to provide experimental benchmark for validation of the proposed numerical model. A numerical simulation of the model is then performed using COMSOL software and the compressive and bending stress-strain curves are obtained.

Keywords: polymer concrete; simulation; characterization

References:

5.

21-27

17-20

- H. Abdel-Fattah and M. M. El-Hawary, Flexural behavior of polymer concrete, Construction and BuildingMaterials, vol. 13, no. 5, pp. 253–262, 1999.
- M.M. Shokrieh, , M. Heidari-Rarani, M. Shakouri, E. Kashizadeh, Effects of thermal cycles on mechanical properties of an optimized polymer concrete, Construction and Building Materials, Volume 25, Issue 8, August 2011, Pages 3540–3549
- 3. Yong-chang Guo and all., Compressive behaviour of concrete structures incorporating recycled concrete aggregates, rubber crumb and reinforced with steel fibre, subjected to elevated temperatures, Journal of Cleaner Production 72 (2014) 193e203
- Kyu-Seok Yeon and all., Deformation behavior of acrylic polymer concrete: Effects of methacrylic acid and curing temperature, Construction and Building Materials 63 (2014) 125–131
- 5. [5] Walter O. Oyawa and all., Polymer concrete-filled steel tubes under axial compression Construction and Building Materials 15 (2001) 187-197.
- 6. Ghobarah, A.; El-Amoury, T. Seismic rehabilitation of deficient exterior concrete frame joints. J. Compos. Constr. 2005, 9, 408–416.
- Ascione, L.; Berardi, V.P. Anchorage device for FRP laminates in the strengthening of concrete structures close to beam-column joints. Compos. B Eng. 2011, 42, 1840–1850
- B. Shigang Ai and all., Numerical analysis on failure behaviour of polyurethane polymer concrete at high strain rates in compression,

- Computational Materials Science 69 (2013) 389–395.
- Z. Agioutantis and all., Numerical simulation of the mechanical behaviour of epoxy based mortars under compressive loads, Computers and Structures 80 (2002) 2071–2084.
- 10. Verma et al., Coir Fibre Reinforcement and Application in Polymer Composites: A Review, J. Mater. Environ. Sci. 4 (2) (2013) 263-276
- J. Toma's San-Jose andall. Reinforced polymer concrete: Physical properties of the matrix and static/dynamic bond behaviour, Cement & Concrete Composites 27 (2005) 934–944.
- 12. Valentino Paolo Berardi, Geminiano Mancusi, A mechanical model for predicting the long term behavior of reinforced polymer concretes, Mechanics Research Communications 50 (2013) 1–7.
- 13. Reis, JML, Fracture and flexural characterization of natural fibre reinforced polymer concrete. Constr. Build Mater. 20(9) (2006) 673-678
- 14. R. Griffiths, A. Ball, An assessment of the properties and degradation behavior of glass-fiber-reinforced polyester polymer concrete, Compos Sci Technol, 60 (14) (2000), pp. 2747–2753
- 15. H. Aboubak and all., Creep of epoxy-clay nanocomposite adhesive at the FRP interface: A multi-scale investigation Sherif, International Journal of Adhesion & Adhesives 54 (2014) 1–12.
- Agioutantis Z, Sisoura D, Kleftakis S. Physico-chemical and mechanical properties of natural and chemically reinforced sands. Mineral Wealth 1999;110:41–8
- 17. Gabriel Oprișan And All. Application Of Modern Polymeric Composite Materials In Industrial Construction, Bul. Inst. Polit. Iași, t. LVI (LX), f. 3, 2010.
- M.M. Shokrieh and all., Effects of thermal cycles on mechanical properties of an optimized polymer concrete, Construction and Building Materials 25 (2011) 3540–3549.
- 19. F.J.C. Del Vecchio and all., Elasto-viscoplastic behaviour of polyester polymer mortars under monotonic and cyclic compression, Polymer Testing 35 (2014) 62–72.