



Innovation for Prosperity

MURANG'A UNIVERSITY OF TECHNOLOGY

INTERNATIONAL CONFERENCE ON TECHNOLOGY
AND INNOVATION FOR SUSTAINABLE DEVELOPMENT

Theme:

HARNESSING TECHNOLOGY AND INNOVATION

TO ADDRESS EMERGING ISSUES

BOOK OF ABSTRACTS



*3rd - 5th
Nov, 2021*



MURANG'A UNIVERSITY OF TECHNOLOGY

**INTERNATIONAL CONFERENCE ON TECHNOLOGY AND INNOVATION FOR
SUSTAINABLE DEVELOPMENT**

PROGRAMME AND BOOK OF ABSTRACTS

DATE

3RD. 5TH NOVEMBER 2021

VENUE

MURANG'A UNIVERSITY OF TECHNOLOGY VIRTUAL PLATFORM

THEME

HARNESSING TECHNOLOGY AND INNOVATION TO ADDRESS EMERGING ISSUES

FUNDAMENTAL STATEMENTS

Vision

A Leading University in Technological Innovation, Research and Training

Mission

To Advance Knowledge and Technological Transfer through Teaching, Training, Learning, Research, and Innovation for Sustainable Development

Core Values

Innovation and Creativity
Professionalism
Teamwork
Freedom of Enquiry
Integrity
Fairness and Non-discrimination

Our Motto

Innovation for Prosperity

CONFERENCE STEERING COMMITTEE

- | | |
|----------------------------|-----------|
| 1. Prof. Richard Juma | Chairman |
| 2. Prof. Sylvia Opiyo | Member |
| 3. Prof. Christopher Maina | Member |
| 4. Dr. Kennedy Muna | Member |
| 5. Dr. George Mose | Member |
| 6. Mr. Stephen Kahara | Member |
| 7. Dr. Peter Waithaka | Secretary |

Secretariat

1. Dr. Grace Wahinya
2. Mr. Jackson Kamiri
3. Mr. John Kihui
4. Ms. Mercy Muchoki

MESSAGE FROM THE CHAIRMAN OF COUNCIL



It is with great pleasure to welcome you all to Murang'a University of Technology (MUT) International Conference.

I wish to acknowledge the efforts made by the Vice Chancellor, Prof. Dickson Nyariki, the Management Board, the Senate, and the academic and administrative staff in hosting this conference. I would also like to recognize the Conference Organizing Committee that has worked tirelessly to make this conference successful.

The main purpose of a conference like this one is to disseminate the findings of research. Research plays a central role in the development of any nation. It enables scholars from different disciplines to gather information that could be used to bring about desirable change in society. However, if the information is not disseminated, the intended impact may not be achieved. Therefore, such a conference offers a platform for sharing ideas. It also serves as a birthing point for projects that can offer solutions to our society.

Projecting forward, the University's Strategic Plan (2019 – 2023) anticipates global, technological and educational changes, and it well-positions our institution to engage in the evolution of 21st Century Science, Engineering and Technology research and education for

the benefit of mankind. In line with this, the University has been keenly focusing on three key pillars—Academic Excellence, Quality, and Institutional Capacity Development—preparing ourselves to be innovative, daring and forward-thinking in our service to society. It is against this background that this conference focuses on technology and innovation for sustainable development.

Murang'a University of Technology is one of the fastest growing universities in the country in terms of infrastructure, new programmes and student population. During my tenure as the Chairman of Council, I have ensured prudent utilization of university resources to run the programmes and improve the facilities, which have enabled this growth to be realized. As a Council, however, we are well-aware that we need the support of various stakeholders, including the National Government, Murang'a County Government, and others, in order to achieve the desired growth; even as we intensify our efforts towards resource mobilization from other partners and stakeholders. It should be noted, however, that there remains a huge gap in human resource and financial outlays to successfully implement our Strategic Plan. I, therefore, appeal to the Government to continue supporting the University financially to meet its objectives and targets as contained in the Plan.

Finally, I wish you all a successful Conference.

Prof. Joachim Osur

CHAIRMAN, MURANG'A UNIVERSITY OF TECHNOLOGY COUNCIL

MESSAGE FROM THE VICE-CHANCELLOR



On behalf of Murang'a University of Technology (MUT), I would like to express my sincere gratitude to the participants as I welcome you to our International Conference on Technology and Innovation for Sustainable Development. The conference is mainly being streamed virtually because of the challenges brought about by the Covid-19 pandemic.

As we may be aware, one of the major roles of universities is to contribute towards research and innovation for the sustainable development of a nation. To disseminate the findings of research and innovations, conferences such as this one are important. They play a major role in the academic and professional activities of all major disciplines, and are central to the pursuits of most associations and societies. This three-day Conference, whose theme is "Harnessing Technology and Innovation to Address Emerging Issues," seeks to provide an opportunity to both experienced and young scholars to present their findings. It is our hope, therefore, that participants in the five thematic areas of the Conference will benefit from our pool of distinguished Keynote Speakers who have been picked based on their experience and valuable contribution in their areas of expertise.

I take this opportunity to sincerely thank our Cabinet Secretary, Ministry of Education, Prof. George Magoha, for accepting to grace the opening ceremony of this Conference. Through his leadership, we have continued to receive immense support from the Ministry, especially in infrastructural development and capitation. We also thank the Council, under the chairmanship of Prof. Joachim Osur, for the support given to the University in terms of oversight. We further wish to acknowledge the various stakeholders who have financially supported the Conference. Finally, we thank the Keynote Speakers and all the participants for **sparing their** time to attend and contribute to this Conference. We wish you all a happy, engaging and successful Conference.

Prof. Dickson Nyariki
VICE-CHANCELLOR, MURANG'A UNIVERSITY OF TECHNOLOGY

MESSAGE FROM THE CHAIRMAN, CONFERENCE COMMITTEE



Research, innovation and technology are the key drivers of development in the world today. Through research, innovation and technology, universities provide the foundations and impetus necessary for transformations. It is with this in focus that our International Conference was conceived to drive the theme: **“Harnessing Technology and Innovation to Address Emerging Issues.”** Given this theme, the international conference is expected to demonstrate why technology and innovation is considered as a major force in economic growth and show some of the most distinctive features of technology and innovation in the economy. In particular, the papers to be presented in this conference attempts to examine a primary single feature, “uncertainty” that dominates the search for innovation and new technologies by drawing several cases on both the developed and developing countries' experience.

However, in response to challenges brought about by Covid-19, this Conference is taking place virtually and has attracted a wide range of participants all over the World. I wish to thank all participants as it is a confirmation that we are committed to improve the standard of living of our people.

Thank you and God bless you.

Prof. Richard Juma
REGISTRAR, ACADEMIC AND STUDENT AFFAIRS & PROFESSOR OF DEVELOPMENT STUDIES

THE UNIVERSITY MANAGEMENT BOARD



Prof. Dickson Nyariki, PhD, Vice Chancellor and Chairman,
University Management Board



Prof. Beatrice W. Mugendi, PhD,
Deputy Vice Chancellor, Finance and Development



Prof. Prisca J. Tuitoek, PhD,
Deputy Vice Chancellor, Academic and Student



Joseph Gachanja, Registrar
Finance and Development



Dr. Peace Agufana, PhD,
Registrar Administration and Planning



Prof. Richard Juma, PhD,
Registrar Academic and Student Affairs



Prof. Sylvia Opiyo, PhD, Ag.
Deans Representatives

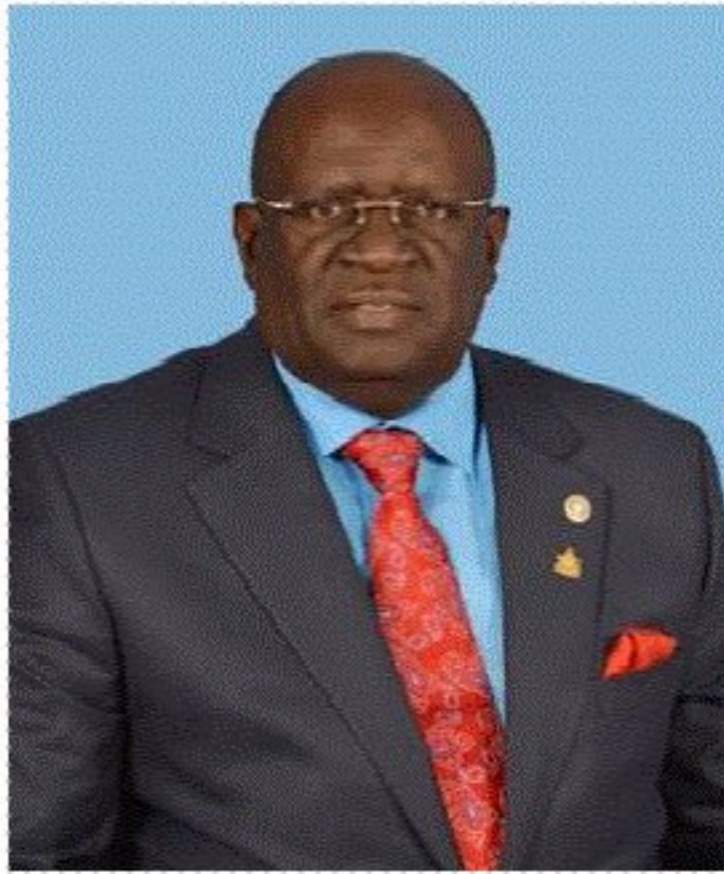


CPA. Moffat K. Njoroge
Ag. Finance Officer

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CHIEF GUEST- OFFICIAL OPENING



PROF. GEORGE ALBERT OMORO MAGOHA, CBS, CABINET SECRETARY

Prof. George Magoha is the Cabinet Secretary, Ministry of Education. He is a Professor of Transplant Surgery. Prof. Magoha was the Chairman of the Kenya National Examinations Council (KNEC). He was also an Honorary Consultant Surgeon and Urologist at Kenyatta National Hospital and Nairobi Hospital. He has served as the Vice-Chancellor of the University of Nairobi, Chairman of the African Network of Scientific and Technological Institutions the Kenya Medical Practitioners and Dentists Board and the Kenya Association of Urological Surgeons (KAUS), and President of the Association of Medical Councils of Africa.

He was the President of the Association of African Universities (AAU) and continues to serve as a member of the AAU Executive Board. He also served as a Commissioner at the Commission for University Education (CUE). He represented the African Continent in the Confucius Council in Beijing, China from 2009-2015.

He is an alumnus of Starehe Boys Centre and Strathmore College. He studied medicine at the University of Lagos in Nigeria. He furthered his studies in Surgery and Urology at Lagos University Teaching Hospital, University College Hospital, Ibadan, Royal College of Surgeons, Dublin, Ireland and Royal Postgraduate Medical School Hammersmith Hospital, London, Department of Urology, where he earned various academic awards. He has training in Executive Management from the Stanford University, Graduate School of Business.

Prof. Magoha established his career in Surgery at the Lagos University Teaching Hospital as an intern and rose to the position of Senior Resident and Clinical Lecturer in Surgery. He also served as a Lecturer in the same hospital and a Consultant Surgeon in various leading hospitals in Nigeria.

Prof. Magoha joined the University of Nairobi as a Lecturer in Urological Surgery and rose through the ranks to become a full Professor of Surgery. He served as Chairman of the Department of Surgery, Dean of the School of Medicine, Principal of the College of Health Sciences, Deputy Vice-Chancellor in charge of Administration and Finance, and Vice-Chancellor of the University of Nairobi.

He is a member of the British Association of Urological Surgeons (BAUS) and Société Internationale d'Urologie (SIU). Prof. Magoha has published more than 60 peer-reviewed publications and supervised to completion over 40 Master of Medicine students. His research interests are in male erectile dysfunction; prostate, testicular and penile cancers; and circumcision and HIV/AIDs.

He received the Distinguished Service Award from the Medical Profession in Kenya. He is also the recipient of the awards of Chief of the Order of Burning Spear (CBS), Moran of the Burning Spear (MBS) and Elder of the Burning Spear (EBS). He is a fellow of the International College of Surgeons (ICS), African Academy of Sciences (AAS), and the Kenya National Academy of Sciences (KNAS).

KEYNOTE SPEAKERS

PROF. R. ENG. P.N. KIONI



Prof. R.Eng. P.N. Kioni is the Vice-Chancellor of Dedan Kimathi University of Technology. He holds a B.Sc. degree in Mechanical Engineering from University of Nairobi and a PhD degree from Cambridge University, UK.

He received research fellowships from Ruhr-University in Germany and Tottori University in Japan. He has published widely and supervised many research students. The core of his research is limiting formation of pollutants in reactive flows. His studies involve development and adaptation of Computational Fluid Dynamics (CFD) and application of lab-based diagnostic tools. He has published widely in this area.

He has served in many University administrative positions across the country. He has also served on various boards across the continent. He has served as a board member of Africa Laser Centre, in South Africa, board of trustees and board of governors for Kimathi Institute of Technology. He was the chair of the board of governors for Nyandarua Institute of Science and Technology and founding chair of the Central Kenya branch. He has served as a member of the Council of Institution of Engineers of Kenya and patron of Council of Deans and Principals of Engineering in Kenya.

ENG. JULIUS MARIMI RIUNGU



Engineer Julius Marimi Riungu is the CEO of Tsavo Power Company Ltd, an Independent Power Producer. He is the former Deputy Managing Director of Kenya Power and Lighting Company. He holds a Bachelor of Science Degree in Electrical and Electronics Engineering from the University College, London.

He has served as a Power Engineering Advisor to the Permanent Secretary in the Ministry of Energy. During this period, he played a leading role in Kenya's electricity sub-sector reforms.

Eng. Riungu has been a Chairman of the Institution of Engineers of Kenya, Chairman of the Jomo Kenyatta University of Agriculture and Technology Council, Management Board Member of Kenya's National Commission for Science, Technology and Innovation, a long serving member of the Engineers Board of Kenya and Past President of the Federation of African Engineering Organizations (FAEO).

He is a member of the Institution of Engineering and Technology and a Chartered Engineer of the U.K. He is also a Registered Consulting Engineer (Kenya), Fellow of the Institution of Engineers of Kenya, and Associate of Chartered Institute of Arbitrators.

ENG. JOHN TANUI, MBS



Eng. John Tanui, MBS is the CEO of the KONZA Technopolis Development Authority. He holds a bachelor's degree in Electrical and Communication Engineering from Moi University and master's degree in International Business from Nairobi University. He is currently pursuing a PhD in global business management.

He is the former Deputy Country CEO and Vice President of Huawei Technologies in Eastern Africa region. Eng. Tanui has over 23 years' experience in the Information, Communication & Technology sector and has worked on the continent and in China.

He is a member of the Institution of Engineers of Kenya (MIEK), a registered engineer and a member of the Academy of International Business. He has been a council member in Jomo Kenyatta University of Science and Technology, Vice Chairman of the council in Technical University of Kenya. He was an Advisory Council Member of the Presidential Digital Talent Program. He currently serves as a Board member in several high schools and SMEs in Kenya.



DR. JEMIMAH GESARE ONSARE

Dr. Jemimah Gesare Onsare is the Ag. CEO of the National Research Fund. She holds a PhD in Microbiology from Guru Nanak Dev University in India. Her research interest is in antimicrobials where she has received grants and published extensively.

Dr. Onsare sits on the Boards of National Commission for Science & Technology (NACOSTI) and Kenya National Innovation Agency (KENIA). She has experience in corporate governance, resource mobilization, establishment of partnerships and collaborations, and management of research grants. She has participated in various programmes within the ST&I sector both at National and International level.



PROF. BITANGE NDEMO

Prof. Bitange Ndemo is Professor of Entrepreneurship at the University of Nairobi. He is the former Permanent Secretary in the Ministry of Information and Communication. He holds a PhD in Industrial Economics from Sheffield University, United Kingdom.

Prof. Ndemo Chaired the Kenya Distributed Ledgers and Artificial Intelligence Taskforce that developed the country's road map for digital transformation. He is an advisor and Board member to several organizations including Safaricom, a member of the OECD Expert Panel for Blockchain and World Economic Forum Global Blockchain Council.

He is a senior advisor to UN's Global Pulse (Big Data initiatives), the UNCDF's Better than Cash Alliance and UNICEF's Innovation Council. He is an Open Data/Big Data evangelist and dedicated to simplification of data for ordinary citizens to consume.

His research centers on the link between Information and Communication Technologies (ICTs)

and small and medium enterprises with emphasis on how ICTs influence economic development in Africa. He writes two columns every week for the Business Daily and Nation on-line.



PROF. OMU ANZALA

Prof. Omu Anzala is a Professor of Virology and Immunology at the University of Nairobi. He was the first Director of KAVI – Institute of Clinical Research.

He holds a degree in medicine from the University of Nairobi; a Diploma in Epidemiology from Tufts University (USA) and a PhD in virology and immunology from University of Manitoba, Canada. He is a Postdoctoral Fellow of the Institute of Molecular Medicine in Oxford University (UK).

Prof. Anzala serves as a member of the Ministry of Health, Vaccination Experts Committee; National Polio Expert Committee, National Vaccine Safety Advisory Committee (Kenya) and African Vaccine Manufacturing Initiative (South Africa), Member of National COVID -19 TASK force and a team leader of National COVID-19 Case management, Research and modelling consortium.

Prof. Anzala is the leading HIV vaccine investigator in Kenya. He co-founded KAVI in 1999 as the HIV Vaccine research Unit in Kenya and moved it to its current status as an Institute of Clinical Research in 2013. He was co-PI of the first HIV vaccine trial in Kenya, the second in Africa, using a DNA plasmid. He has subsequently been PI or co-PI for 11 IAVI-funded HIV vaccine trials in adults and the first paediatric HIV vaccine trial in Kenya. Additionally, Prof. Anzala has been the Principal Investigator for the just completed Phase I & Phase II Candidate Ebola Vaccine Trials, which were funded by Janssen & Janssen.

In addition to HIV research Prof Anzala has pioneered research in infectious elements at the human-animal interface and bringing together collaborators from Europe, India, and other African Countries.

He has authored and co-authored over 130 peer-reviewed publications, supervised and mentored over 30 Masters and 10 PhD students to successful completion of their studies and continues to do the same for many more.



DR. DEBBI MARAIS

Dr. Debbi Marais is the Director of Postgraduate Education at Warwick Medical School and a Principal Fellow of the UK Higher Education Academy. She holds PhD and master's degrees in Nutrition from Stellenbosch University.

Dr. Marais worked in the public sector in South Africa before joining academia. She has more than 20 years of experience in the higher education environment at Stellenbosch University in South Africa, University of Aberdeen in Scotland and at University of Warwick in England.

She is a post-doctoral researcher with a focus on Pedagogical and Public Health Nutrition research. She is committed to supporting and promoting innovative teaching, reflective practice and enhancing the student experience. She has a proven track record in successfully supervising postgraduate student research and securing external funding as part of collaborative teams. Dr. Marais has excellent communication skills as evidenced by her publications, reviewer role and international, national and public engagement presentations.



PROF. HAMADI IDDI BOGA

Prof. Hamadi Iddi Boga is the Principal Secretary of the State Department for Agricultural Research in the Ministry of Agriculture, Livestock, Fisheries and Irrigation. He is the former founding principal of Taita Taveta University and was its Vice Chancellor between 2007 and 2017. He holds a PhD in biology from Universität Konstanz in Germany.

He was a professor in the Department of Botany at the Jomo Kenyatta University of Agriculture and Technology. His research interests are in biology, agricultural science, sequencing, microbiology, molecular biological techniques and RNA genes. He also has an interest in microbial ecology of insects' guts, soils and soda lakes and has worked with termites, the soda lakes of Kenya, mangrove swamps, agricultural and forest soils and also on Mount Kenya glacier.



DR. LOICE ACHIENG OMBAJO

Dr. Loice Achieng Ombajo heads the Infectious disease unit at the Kenyatta National Hospital. She is the program director for the Infectious Disease Fellowship program at the University of Nairobi. She is a lecturer in Internal Medicine at the University of Nairobi and an adjunct assistant professor of Medicine at the University of Texas Medical Branch.

She holds an MBChB and MMED in Internal Medicine from the University of Nairobi, a Diploma in Tropical Infectious Diseases from the The London School of Hygiene & Tropical Medicine and a master's degree in Infectious Diseases from the University of London.

She is the Secretary of the HIV Clinicians Society of Kenya. Her research interests include improving outcomes in sepsis, antimicrobial stewardship and cardiometabolic disease in HIV. She has done clinical rotations in infectious diseases at the University of Maryland in Baltimore and University of Texas.

CONFERENCE PROGRAMME, 3RD – 5TH NOVEMBER, 2021

CONFERENCE DAY ONE, 3RD NOVEMBER, 2021		
TIME	ACTIVITY	RESPONSIBLE
07:30- 08:30am	Arrival and registration of guests	Dr. B.M. Mwangi
08:30-08:40	Housekeeping announcements	
08:40-09:00	Arrival of the Chief Guest	
SESSION 1: OFFICIAL OPENING CEREMONY		
SESSION 1 A: SETTING THE PACE		
TIME	ACTIVITY	RESPONSIBLE
9:10- 9:20	Kenya National Anthem, East African Community Anthem, and Opening prayer	Dr. B.M Mwangi
9:20-9:30	Remarks by Chairman of the Conference Steering Committee	Dr. Peace Agufana, Registrar, A&P, MUT
9:30-9:35	Deputy Vice Chancellor, Academic and Student Affairs (ASA) invites the Vice Chancellor	Prof. Richard Juma, Registrar, ASA, MUT
9:30- 10:00	Remarks by Vice Chancellor and invites Chairman of Murang'a University of Technology (MUT) Council	Prof. Prisca J. Tuitoek, DVC-ASA, MUT
10:00-10:30	Address by Murang'a University of Technology Council Chairman and invites the Chief Guests	Prof. Dickson Nyariki, Vice Chancellor, MUT
10:30-1:00pm	Official opening: Chief Guest	Prof. Joachim Osur, Council Chairman, MUT
	Prof. George Magoha - Cabinet Secretary, Ministry of Education	
PHOTO SESSION		
1:00-1:30	Participants Join breakout rooms	
SESSION 2: BREAKOUT ROOM 1		
SUB THEME: ENGINEERING AND TECHNOLOGIES FOR THE 4TH INDUSTRIAL REVOLUTION		
TECHNICAL SESSION I: PAPER PRESENTATIONS		
TIME	ACTIVITY	RESPONSIBLE
1:30-2:00pm	Keynote speaker address	Session Chair: Prof. Christopher Maina Rapporteur: Dr. Kennedy Ogilla ICT Personnel Ms. Ann Rose Kirigo
	Prof. R. Eng P.N Kioni – Vice Chancellor, Dedan Kimathi University of Technology	
2:00-2:15	The Impact of Prior Exposure To Engineering Through The MUT Pre-College Course - A Case Study of Kangema Sub-County Secondary Schools. <i>Peter N. Mwangi, Faith N. Mutinda, Ernest Githinji, Victor Njuguna, Ann Barasa, Shadrack Cheruiyot, Geoffrey Kipkogei, Cyrus Mwaniki, Wilson Karuru, Tom M Okaya, Christopher M. Muriithi</i>	
2:15-2:45	Engineering Exhibition: Engineering Skills where they are most needed	

2:45-3:00	Optimal Allocation of FACTS Devices in Power Systems Using Metaheuristics: A Review. <i>Mohamed Amidu Kallon, George Nyauma Nyakoe and Christopher Maina Muriithi</i>	
3:00-3:15	Improving Tea Drying Energy Efficiency in a Fluid Bed Dryer. <i>Charana, Joshua Mosigisi</i>	
3:15-3:45	PLENARY SESSION	
END OF DAY'S ACTIVITIES		
CONFERENCE DAY 2: THURSDAY 4 TH NOVEMBER 2021		
TIME	ACTIVITY	RESPONSIBLE
9:00-9:30am	Opening session (common for all), Panelist discuss topical issues	Session Chair: Dr. Nicholas Oyie Rapporteur: Mr. Brian Wamukoya ICT Personnel Ms. Anne Rose Kirigo
9:30-10:00	Keynote speaker address	
	Eng. Julius Riungu – CEO, Tsavo Power	
10:00-10:15	A Review of Wind Prediction Techniques and Optimal Storage Sizing of BESS. <i>Hampfrey Zurua Odera, Cyrus Wekesa, George Kimani Irungu</i>	
10:15-10:30	A Voltage Stability Constrained Optimal Power Flow using Multiobjective Particle Swarm Optimization Algorithm. <i>Rebeccah Kyomugisha, Christopher Maina Muriithi and Milton Edimu</i>	
10:30- 10:45	Efficient Control Strategy Based on Instantaneous Power Theory and Model Predictive Control for Grid Connected Photovoltaic System. <i>Ricsa Alhassane Soumana, Michael Juma Saulo and Christopher Maina Muriithi</i>	
10:45-11:00	Energy Management System for Solar and Grid System. <i>Masika J. W., Muriithi C. M., Apiyo E. O., Mbura C. M. and Mwanza S. K.</i>	
11:00-11:20	PLENARY SESSION	
11:20-11:35	Motor Speed Control Kits Using a Microcontroller. <i>Mwanza S. K., Nganga B. K., Muriithi C. M. and Wanjeru P. M.</i>	
11:35-11:50	Single Axis Solar Tracking System. <i>Mbura C. M, Muriithi C. M, Mwanza S. K and Nganga B. K</i>	
11:50:12:05	Multipath Clustering for Wireless Channel Modelling at 22 GHz Based on Kernel Density Estimation. <i>Nicholas O. Oyie</i>	Session Chair: Dr. Kennedy Ogilla Rapporteur: Mr. Felix Biketi ICT Personnel Ms. Anne Rose Kirigo
12:05-12:20	A Systematic Review on the Impact of Educational Robots to Secondary School Learning and Choice of STEM subjects. <i>Mwangi Peter Ngugi, Christopher Maina and Dr. Peace Agufana</i>	
12:20-12:40	PLENARY SESSION	
12:40-12:55	SMART Meter Box. <i>James Kirika, Brian Wamukoya, Mbura Migiro, David Kimemia</i>	
12:55- 1:10	Detection and Correcting Illegal Power Connection in Kenya. <i>Karobia Pauline N.</i>	

1:10-1:25	Automatic Face Mask Detector: A Deep Learning Approach. <i>Mathew N. Mugo, Joseph W. Mwangi and Nicholas O. Oyie</i>	
1:25-1:40	Water Bath Temperature Control Using PID Controller. <i>Muthiani J.K, Oyie N.O, Kimemia D.N, Kimondiu S.M</i>	
1:40-2:10	PLENARY SESSION	
	Natural Resources Sub-Theme papers: Breakout Room 1	
2:10 -2:25	Analysis of Pesticide Residues in Tomatoes and French Beans in Murang'a and Kiambu Counties, Kenya. <i>E. Kipkemoi, W. A. Andayi, E. Njagi and B. Ptoton</i>	Dr. Warren Andayi Rapporteurs: Dr. Tetty Osewe ICT Personnel Ms. Ann Rose Kirigo
2:25-2:40	The potential of avocado seeds and peels as an animal feed supplement. <i>Ndungu Esther, Waithaka Peter, Mugendi Beatrice and Waweru Isaac</i>	
2:40-3:10	PLENARY SESSION	
END OF DAY'S ACTIVITIES		
CONFERENCE DAY 3: FRIDAY 5 TH NOVEMBER 2021		
TIME	ACTIVITY	RESPONSIBLE
9:00-9:30am	Opening session (common for all), Panelist discuss topical issues	Dr. Warren Andayi Rapporteurs: Dr. Tetty Osewe ICT Personnel Ms. Ann Rose Kirigo
9:30-9:45	Mineral fertilizer uptake improves rural welfare: Evidence from smallholder sorghum farmers of Western Kenya. <i>Collins M. Musafiri Onesmus K. Ng'etich, Milka Kiboi, Joseph Macharia and Felix K. Ngetich</i>	
9:45-10:00	Tuning physicochemical properties of Nitrogen doped carbon nanotubes. <i>Godfrey Keru, Vincent O. Nyamori and Patrick G. Ndungu</i>	
10:00-10:30	PLENARY SESSION	
OFFICIAL CLOSING CEREMONY (See end of programme)		

CONFERENCE DAY1: WEDNESDAY 3 RD NOVEMBER 2021		
BREAKOUT ROOM 2		
SUB THEME: ICT FOR DEVELOPMENT AND DISRUPTIVE INNOVATIONS		
TECHNICAL SESSION I: PAPER PRESENTATIONS		
TIME	ACTIVITY	RESPONSIBLE
1:30-2:00pm	Keynote Speakers:	Session Chair:

	Eng. John Tanui- CEO Konza Technopolis	Prof. Geoffrey Muchiri
2:00-2:15	Evaluation of the Impact of Empirical Risk Minimization on Supervised Deep Learning Model Generalization and Selection. <i>Stephen Kahara Wanjau, Geofrey Mariga Wambugu and Aaron Mogeni Oirere</i>	Rapporteur: Dr. Stephen Njenga
2:15-2:30	Baggage Screening Using Color Extraction and Blockchain Algorithm <i>Stanley Githinji</i>	ICT Personnel Mr. Jackson Kamiri
2:30-2:45	The Influence of Selected Common ICT Platforms on Conflict Prevalence in Kenya. <i>Jacob Asige Chavulimu</i>	
2:45-3:05	PLENARY SESSION	
END OF DAY'S ACTIVITIES		
CONFERENCE DAY 2: THURSDAY 4 TH NOVEMBER 2021		
TECHNICAL SESSION 2: PAPER PRESENTATIONS		
TIME	ACTIVITY	RESPONSIBLE
9:00-9:30am	Opening session (common for all), Panelist discuss topical issues	Session Chair: Dr. Geoffrey Mariga
9:30-9:45	Scalability of Distributed Ledger Technology and Types of Internet of Things: A Systematic Literature Review. <i>Peter Kimemiah Mwangi, Stephen Njenga and Gabriel Kamau</i>	Rapporteur: Dr. John Ndia
9:45-10:00	A Comparative Study of the Lexicographical Complexity of Java ,Python, and C Programming Languages Based on Program Characteristics. <i>Kevin Agina Onyango, Jackson Kamiri Wambugu and Geoffrey Muchiri Muketha</i>	ICT Personnel Mr. Jackson Kamiri
10:00-10:15	Assessment of Online Learning at Murang'a University of Technology. <i>Ayubu Anapapa Okango</i>	
10:15-10:30	Towards enhancing the benefits of ICT-mediated disintermediation to cultural and heritage tourism enterprises: A conceptual framework. <i>Rayvisic Mutinda Ndivo</i>	
10:30-10:50	PLENARY SESSION	
10:50-11:05	A Systematic Literature Review of Meta-Learning Models for Classification Tasks. <i>Jackson Kamiri Wambugu, Geoffrey Mariga Wambugu</i>	Session Chair: Dr. Gabriel Kamau
11:05-11:20	A systematic review of Sign Language recognition classification algorithms. <i>Tirus Muya Maina</i>	Rapporteur: Everleen Nekesa
11:20-11:35	Comparative Analysis of Machine Learning Algorithms for Maize Leaf Disease Identification. <i>Vincent Mbandu Ochango, Geoffrey Mariga Wambugu and John Gichuki Ndia</i>	ICT Personnel Mr. Jackson Kamiri
11:35-11:50	Information Security Metrics Models: A Systematic Literature Review. <i>Jane Wanjiru Njuki, Geoffrey Muchiri Muketha and John Gichuki Ndia</i>	
11:50-12:10	PLENARY SESSION	Session Chair: Dr. Aaron Oirere
12:10-12:25	Analysis of Existing Credit Authentication Models for Credit Authorization. A Systematic Literature Review. <i>Patrick Mwenda, Gabriel Kamau and Stephen Njenga</i>	Rapporteur: Dr. John Ndia
12:25- 12:40	Design of a Classifier for Tomato Leaf Disease Identification. <i>Hellen wasike, Stephen Njenga and Geoffrey Mariga</i>	ICT Personnel Mr. Jackson Kamiri
12:40-1:50	PLENARY SESSION	

Natural Resources Sub-Theme papers: Breakout Room 2		
1:50- 2:05	Insecticidal Constituents of <i>Ocimum Kilimandscharicum</i> Guerke Acclimatized in Kakamega Forest, Kenya. <i>Albert M. Makenzi, Lawrence O.A. Manguro, Philip O. Owuor and Sylvia A. Opiyo</i>	Session Chair: Dr. B.M Mwangi Rapporteur: Dr. Sharon ICT Personnel Mr. Jackson Kamiri
2:05-2:20	Modeling Infant Mortality Risk Factors Using Logistic Regression Model and Spatial Analysis in Kenya. <i>Erick Kirui, Elphas Luchemo and Ayubu Anapapa</i>	
2:20-2:35	Modeling conditions of storing quality commercial eggs. <i>Jacqueline A. Gogo, Benson E. Atitwa, Cyrus N. Gitonga and David M. Mugo</i>	
2:35 - 2:50	Spatial modeling of malaria prevalence in Kenya. <i>Morris Mwenda John</i>	
3:50-3:20	PLENARY SESSION	
END OF DAY'S ACTIVITIES		
CONFERENCE DAY 3: FRIDAY 5 TH NOVEMBER 2021		
TIME	ACTIVITY	RESPONSIBLE
9:00-9:30	Opening session (common for all), Panelist discuss topical issues	
9:30-9:45	Effect Of Coffee Extract On Lactic Acid Bacteria, Fungi and Functional Properties of Coffee Flavoured Yoghurt. <i>Jonah Mbae, Richard Koskei and Beatrice Mugendi</i>	Session Chair: Dr. John Mutuguta Rapporteur: Mr. Jusper Wendo ICT Personnel Mr. Jackson Kamiri
9:45-10:00	Characterization of black nanosilver doped TiO ₂ prepared by In Situ method. <i>Dorah K. Muthee and Birhanu F. Dejene</i>	
10:00-10:30	PLENARY SESSION	
OFFICIAL CLOSING CEREMONY (See end of programme)		

CONFERENCE DAY 1		
BREAKOUT ROOM 3		
SUB THEME: NATURAL RESOURCES AND CLIMATE CHANGE MANAGEMENT FOR ENHANCED FOOD SECURITY AND NUTRITION		
TECHNICAL SESSION I: PAPER PRESENTATIONS		
TIME	ACTIVITY	RESPONSIBLE
1:30- 2:00pm	Keynote Speakers	Session Chair: Prof. Prisca Tuitoek Rapporteur: Dr. John Mutuguta ICT Personnel Mr. Evan Njeru
	Prof. Hamadi Boga – Principal Secretary, State Department of Agricultural Research	
2:00-2:15	Does Privatizing Agricultural Extension Guarantee Downward Accountability to Small-Scale Rural Farmers. <i>George Nyarigoti Mose</i>	
2:15-2:30	Conservation status of Murang'a County Wetlands, Kenya. <i>Benson M. Mwangi, James Wambua Kaluli and Titus Ndiwa</i>	

2:30-2:45	Impact of Riparian Community's livelihood strategies on Wetlands Conservation and Restoration in Murang'a County, Kenya. <i>Isaiah O. Abillah, Richard Juma, Clifford Machogu and Benson M. Mwangi</i>
2:45-3:05	PLENARY SESSION
END OF DAY'S ACTIVITIES	

CONFERENCE DAY 2: THURSDAY 4 TH NOVEMBER 2021		
TECHNICAL SESSION I: PAPER PRESENTATIONS		
TIME	ACTIVITY	RESPONSIBLE
9:00-9:30am	Opening session (common for all), Panelist discuss topical issues	Session Chair: Dr. George Mose Rapporteur: Dr. Keru ICT Personnel Mr. Evan Njeru
9:30-9:45	Effects of enrichment planting on population structure, diversity and canopy cover of indigenous tree species in Mount Kenya forest, Kenya. <i>Peter G. Njoka, Charles M. Warui and Winfred Musila</i>	
9:45-10:00	Adaptability of different potato varieties to different moisture and temperature conditions in the semi-arid areas in Kenya. <i>Diana Gitonga</i>	
10:00-10:15	Fish Species Composition and Diversity in South and North Mathioya Rivers, Murang'a County, Kenya. <i>Ngodia S. Naipamei, Benson M. Mwangi, Titus Ndiwa and Rawlynce Bett</i>	
10:15-10:30	Anthropogenic Stressors Driving Wetland Loss in Mathioya Watershed, Murang'a County, Kenya. <i>Movin O. Oginga</i>	
10:30-11:50	PLENARY SESSION	
11:50-12:05	Composition and diversity of Bird Species of Murang'a County Wetlands, Kenya. <i>Misael Osano, Benson M. Mwangi and Tittus Ndiwa</i>	Session Chair: Dr. Charles Warui Rapporteur: Dr. Ayubu Anapapa ICT Personnel Mr. Evan Njeru
12:05-12:20	Understanding gender differences in agricultural technology adoption: Zai technology in the drylands of Upper Eastern Kenya. <i>Amos M. Ndeke, Jayne N. Mugwe, Hezron Mogaka, George Nyabuga, Milka Kiboi, Felix Ngetich, Monicah Mucheru-Muna, Isaya Sijali and Daniel Mugendi</i>	
12:20-12:35	Patterns of Elephant crop raiding and damage levels encountered by farming communities in Laikipia County, Kenya. <i>Patrick M. Gichohi, Benson M. Mwangi and Kiplagat Kotut</i>	
12:35-12:50	Evaluation of the quality status of African nightshade seed produced by farmers in Kenya. <i>S.L. Kimaru, D.C. Kilalo, W.M. Muiru and J.W. Kimenju</i>	
12:50-1:10	PLENARY SESSION	
1:10-1:25	Factors affecting small scale farmers coping strategies to climate change in Vihiga county in Kenya. <i>Caroline Mulinya</i>	
1:25-1:40	Effectiveness of soil and water conservation and soil fertility management practices on runoff, sediment and nutrient loss in the drylands of Tharaka-Nithi County in Kenya. <i>Oduor O. Nathan, Ngetich K. Felix, Mucheru-Muna Monicah, Mugwe N. Jayne, Diels Jan and Mugendi N. Daniel</i>	
1:40-1:55	Communication Factors Influencing Adoption of Selected Soil and Water Conservation Technologies in the Dry Zones of the Central Highlands of Kenya. <i>Maureen W. Njenga, Jayne N. Mugwe, Hezron Mogaka, George Nyabuga, Milka Kiboi, Felix Ngetich, Monicah Mucheru-Muna, Isaya Sijali and Daniel Mugendi</i>	

1:55-2:10	Overview of Nitrogen Use Efficiency in Enhancing Food Security in Kenya: Progress and Challenges. <i>Charles Nyambane Onyari and Alice Kosgei</i>	
2:10-2:30	PLENARY SESSION	
2:30-2:45	Food insecurity a perceived barrier to healthy eating in the Lake Victoria Region, Kenya: Findings from a qualitative study. <i>Emily C. Korir, Prisca J. Tuitoek and Debbi Marais</i>	
2:45-2:30	Implementing Environmental Safeguards for Environmental Sustainability in Meru. <i>Lydia Nyawira Mburia</i>	
2:30-3:00	PLENARY SESSION	
END OF THE DAY'S ACTIVITIES		
CONFERENCE DAY 3: FRIDAY 5 TH NOVEMBER 2021		
TIME	ACTIVITY	RESPONSIBLE
9:00-9:30am	Opening session (common for all), Panelist discuss topical issues	Session Chair: Dr. Dennis Otieno Rapporteur: Dr. Grace Njogu ICT Personnel Mr. Evan Njeru
9:30-9:45	Effect of Acid Treatment on the Chemical Properties of Clays from Selected Sites in Murang'a and Nyeri counties, Kenya. <i>Hassan M. Lomertwala, Peter W. Njoroge, Sylvia A. Opiyo and Brian M. Ptoon</i>	
9:45-10:00	Characterisation of <i>Fusarium</i> species infecting tomato in Mwea West Sub-county, Kirinyaga County, Kenya. <i>M. W. Mwangi, W. M. Muiru and J. W. Kimenju</i>	
10:00-10:15	Enhancement of Silicon Solar Cell Retention using Rare Earth Materials. <i>David N. Kimemia</i>	
10:15-10:45	PLENARY SESSION	
OFFICIAL CLOSING CEREMONY (See end of programme)		

CONFERENCE DAY 1: WEDNESDAY 3 RD NOVEMBER 2021		
BREAKOUT ROOM 4		
SUB THEME: COVID 19 PANDEMIC: OPPORTUNITIES AND CHALLENGES		
TECHNICAL SESSION I: PAPER PRESENTATIONS		
TIME	ACTIVITY	RESPONSIBLE
1:30-2:00pm	Keynote Speakers	Session Chair: Prof. Beatrice Mugendi Rapporteur: Dr. Nicholas Ngumi ICT Personnel Mr. Kenan Mutembei
	Prof. Omu Anzala – Virologist, University of Nairobi	
2:00-2:15	Health facility factors influencing secondary prevention practices among type 2 diabetes mellitus patients in Meru county, Kenya: a hospital descriptive correlational study. <i>Ngari D. Mugambi, Munzi A. Mbisi, Machwara S Nyamiaka and Njogu T Wanjiru</i>	

2:15-2:30	The Impact of the Novel Coronavirus in Education: Salient features learnt in primary School Institutions of learning, Kenyan perspective. <i>Alice Omariba</i>	
2:30-2:45	Post-covid-19 pandemic period: a time to embrace and explore further online teaching and learning possibilities or revert to traditional systems. <i>Adrew Makori</i>	
2:45-3:05	PLENARY SESSION	
END OF DAY'S ACTIVITIES		
CONFERENCE DAY 2: THURSDAY 4 TH NOVEMBER 2021		
TIME	ACTIVITY	RESPONSIBLE
9:00-9:30am	Opening session (common for all), Panelist discuss topical issues	Session Chair: Dr. Andrew Makori
9:30-9:45	The policy dimensions of the digital teaching learning process in public learning institutions in Africa. <i>Dennis Otieno, Alice Omariba and Ruth Mwendu</i>	Rapporteur: Dr. Alice Omariba
9:45-10:00	Perceptions and experiences of online teaching and learning by private primary school teachers in Kiambu County during Covid-19 pandemic in Kenya. <i>Chege, S. Ngang'a, Nicholas, G, Bundi and Githaiga, Nancy</i>	ICT Personnel Mr. Mutembei
	Keynote Speakers	
10:05-10:35	Dr. Debbi Marais – Reader and Director of Postgraduate Taught Programmes, University of Warwick, U.K.	
10:35- 10:50	Diffusion of COVID-19 misinformation in Kenyan Twitter Conversations. <i>John Ndavula and Anne Munuku</i>	
10:50-11:05	Beating Odds in Post Pandemic Times: Opportunities in Hosting Sports Tourism Events. <i>Lilian Wanyonyi</i>	
11:05-11:20	PLENARY SESSION	
11:20-11:35	Adjusting Academic Library Services to Covid-19 Prevention Protocols. <i>Martha Wanjiku Thuo</i>	
11:35-11:50	Conspiracy between Covid-19 and Education in Selling of Water to Buy Drought in the Rangelands. <i>Moses Mwangi</i>	
11:50-12:05	Tourism industry transformation in the wake of Covid-19 pandemic in Kenya: Best practices, opportunities and challenges. <i>Eusabia B. Ondieki, Dorothy A. Amwata, Godrick M. Bulitia and Dickson M. Nyariki</i>	
12:05-12:20	Covid-19 Pandemic: Opportunities and Challenges in the Tourism Industry. <i>Elijah Gichuru Muiruri</i>	
12:20-12:30	PLENARY SESSION	
12:30- 12:45	Social Cultural and Economic Factors Affecting the Practice of Secondary Prevention among Patients with Type 2 Diabetes Mellitus at Consolata Nkubu and Meru Level Five Hospital in Meru County. <i>Annastacia Mbisi, Dennis Mugambi Ngari, Teresia Wanjiru Njogu</i>	Session Chair: Dr. Kennedy Muna
12:45-1:00	WhatsApp as a platform for participating in sexual and reproductive issues for women with disabilities in Kenya. <i>Jackline Lidubwi and John Ndavula</i>	Rapporteur: Dr. Esther Muitta
1:00-1:15	The journey to online teaching in Kenyan University Education: Opportunities and challenges. <i>Mercy Igoki Samuel and Jackson Langat</i>	ICT Personnel Mr. Kenan Mutembei

1:15-1:30	Access to health information for persons with disabilities during the Covid-19 pandemic in Kenya. <i>John Ndavula and Lidubwi Jackline</i>	
1:30 - 1:50	PLENARY SESSION	
1:50-2:05	The Use of social media by the Government in Covid-19 Management in Kenya: Opportunities and Challenge. <i>Nancy Githaiga, Samuel Chege and Hailay Shifare</i>	
2:05-2:20	The level of awareness of autism spectrum disorder (ASD) in private and public primary school teachers: evidence of Murang'a East Sub- County. <i>Simon Michire and George N. Mose</i>	
2:20-3:00	PLENARY SESSION	
END OF DAY'S ACTIVITIES		
CONFERENCE DAY 3: FRIDAY 5 TH NOVEMBER 2021		
TIME	ACTIVITY	RESPONSIBLE
9:00-9:30am	Opening session (common for all), Panelist discuss topical issues	Session Chair: Dr. John Ndavula Rapporteur: Dr. Nancy Githaiga ICT Personnel Mr. Kenan Mutembei
9:30-10:00	Keynote Speakers	
	Dr. Loise Ombajo - University of Nairobi and Head of Infectious Disease Unit at Kenyatta National Hospital.	
10:00-10:15	Effect of covid-19 on performance of Saccos in Kenya. <i>Florence W. Kariuki , Irene Muraru and Sarah Kinyanjui</i>	
10:15-10:30	Impact of Covid-19 pandemic on renewable energy use by manufacturing Companies in Kenya. <i>Gathogo George</i>	
10:30-10:50	PLENARY SESSION	
OFFICIAL CLOSING CEREMONY (See end of program)		

CONFERENCE DAY 1: WEDNESDAY 3 RD NOVEMBER 2021		
BREAKOUT ROOM 5		
SUB THEME: ENTREPRENEURSHIP AND COMMUNITY DEVELOPMENT		
TECHNICAL SESSION I: PAPER PRESENTATIONS		
TIME	ACTIVITY	RESPONSIBLE
1:30-2:00pm	Keynote Speakers	Session Chair: Prof. Richard Juma Rapporteur: Dr. Tabitha Karanja ICT Personnel Ms. Jane Wainaina
	Dr. Jemimah Onsare - CEO, National Research Fund	
2:00-2:15	Application of Public Private Partnerships within Nairobi Metropolitan region for entrepreneurship and community Development. <i>Daniel Mutegi Giti</i>	
2:15-2:30	Technology and Innovation Strategic Integrated Ticketing and Sustainable Mobility of Matatu SACCO's in Public Transport Sector in Nairobi County, Kenya. <i>Priscilla Wambui Muhoro</i>	

2:30-2:45	The Relationship Between Consistency, Entrepreneurial Orientation and Performance of Christian Church Owned Hotels in Kenya. <i>Ruth Muriithi</i>	
2:45-3:05	PLENARY SESSION	
END OF DAY'S ACTIVITIES		
CONFERENCE DAY 2: THURSDAY 4 TH NOVEMBER 2021		
TECHNICAL SESSION I: PAPER PRESENTATIONS		
TIME	ACTIVITY	RESPONSIBLE
9:00-9:30am	Opening session (common for all), Panelist discuss topical issues	Session Chair: Dr. George Gathogo Rapporteur: Dr. Ruth Murithi ICT Personnel Ms. Jane Wainaina
9:30-10:00	Keynote Speaker	
	Prof. Bitange Ndemo - University of Nairobi, School of Business	
10:00-10:15	Legal Framework and the Adoption of Cross-Network Mobile Money Transfer Service by Small and Medium-Sized Enterprises (SMEs) In Murang'a Municipality. <i>Stanley Momanyi and Richard Juma</i>	
10:15-10:30	Tourism industry transformations in the wake of Covid-19 pandemic in Kenya: Best practices, challenges and opportunities. <i>Eusabia B. Ondieki, Dorothy A. Amwata, Godrick M. Bulitia and Dickson M. Nyariki</i>	
10:30-10:45	Investigating The Relationship Between Pricing Strategies and Value Proposition Environment Focusing on Electricity (KPLC) In Murang'a County, Kenya. <i>Sheila Karimi Nyaga, Ruth Muriithi and Caroline Igoki Mwangi</i>	
10:45-11:00	An assessment of employee engagement and transformational leadership perceptions for Organizational Performance in the Banking Sector in the face of COVID-19. <i>Monah Maundu, Caroline Igoki Mwangi and Christine Syombua Kathukya</i>	
11:00-11:20	PLENARY SESSION	
11:20-11:35	Effects of quality management on performance of County Governments in Kenya. <i>Grace Njeri Wahinya</i>	
11:35-11:50	Assessment of the effect of moderated internal audit practices on financial performance of NSE listed banks. <i>Ruth Mwendu, Grace Njogu, and Dennis Otieno</i>	
11:50-12:05	The contribution of the entrepreneurship ecosystem in inculcating entrepreneurial propensity for community development in Kenya. <i>Tabitha Karanja and Ruth Muriithi</i>	
12:05-12:20	Effect Of on-the Job Training Technique on Job Performance at Murang'a University of Technology in Kenya. <i>Peace Byrne Agufana</i>	
12:20-12:40	PLENARY SESSION	
12:40-12:55	Linking Strategic Planning to Firm Performance of Food Processing Firms in Kenya: The Role of Entrepreneurial Orientation. <i>Beth Karani Mbore, Kenneth Lawrence Wanjau and Josphat Kinyanjui</i>	Session Chair: Dr. Grace Njogu Rapporteur: CPA Richard Nganga ICT Personnel Ms. Jane Wainaina
12:55- 1:10	Division Or Dialogue. Government Perspective On The Management Of Cattle Rustling Among Pastoral Communities In Kenya. <i>Kepha Marube, Richard Juma, Evans Oteki</i>	
1:10-1:25	Relationship between organizational culture and service quality in Universities in Kenya. <i>Ngugi, Diana Wanjiku, Gachunga, Hazel and Mukanzi, Clive</i>	

1:25-1:40	The influence of firm's culture on organizational performance among insurance companies in Kenya. <i>Mwangi Grace Wangari</i>	
1:40-2:00	PLENARY SESSION	
2:00-2:15	Training in agriculture and natural resource management in institutions of higher learning in Kenya: The need for review of curricula. <i>Dorothy A. Amwata and Dickson M. Nyariki</i>	
2:15-2:30	E-Supplier Payment and Organizational Performance. <i>Wanjiku Nyokabi Ruth, Evans Oteki and Grace Njogu</i>	
2:30-2:45	Assessing the drivers of enhanced auditors' performance: A case study in public universities in Kenya. <i>Ruth Mwende and Dennis Otieno</i>	
2:45-3:05	PLENARY SESSION	
END OF THE DAY'S ACTIVITIES		

CONFERENCE DAY 3: FRIDAY 5 TH NOVEMBER 2021		
TIME	ACTIVITY	RESPONSIBLE
9:00-9:30am	Opening session (common for all), Panelist discuss topical issues	Session Chair: Dr. Grace Mwangi Rapporteurs: Dr. Florence Kariuki ICT Personnel Ms. Jane Wainaina
9:30-9:45	Effect of Receivables Management Practice on Performance of Commercial Banks in Kenya. <i>Wilson Aggrey Ogama Kitere</i>	
9:45-10:00	The Contribution of Work Life Balance Benefits on Employee Performance in the State Corporations: The Kenyan Context. <i>Regina Wairimu Kamwenji</i>	
10:00-10:15	Enhancing the Contribution of Higher Education in the Fourth Industrial Revolution. <i>Ndirangu Ngunjiri</i>	
10:15-10:45	PLENARY SESSION	
OFFICIAL CLOSING CEREMONY		
TIME	ACTIVITY	RESPONSIBLE
12:00-12:10pm	Remarks by Deputy Vice Chancellor, Finance & Development (F&D) and invites the Vice Chancellor	Mr. Joseph Gachanja, Registrar, F&D
12:10-12:30	Closing remarks by Vice Chancellor	Prof. Beatrice Mugendi DVC - F&D, MUT
END OF CONFERENCE		

SUB-THEME 1: ENGINEERING TECHNOLOGIES FOR THE 4TH INDUSTRIAL REVOLUTION

The Impact of Prior Exposure to Engineering Through the MUT Pre-College Course - A Case Study of Kangema Sub-County Secondary Schools

Peter N. Mwangi¹, Faith N. Mutinda, Ernest Githinji, Victor Njuguna, Ann Barasa, Shadrack Cheruiyot, Geoffrey Kipkogei, Cyrus Mwaniki, Wilson Karuru, Tom M. Okaya, Christopher M. Muriithi

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Abstract

In Kenya, secondary schools have a great role in preparing learners for career progression. In order to realize industrial growth, it is important to prepare more students for careers in STEM. There is relatively little research that exists on the impact of prior exposure to Engineering through pre-college sessions to students' attitude in STEM subjects. In addition, Industry 4.0 requires that the 21st century student be exposed to current trends in the industry. The purpose of this research is to investigate the impact of the pre-college sessions as a mode of prior exposure to Engineering to secondary school students on learning STEM subjects. The pre-college exposure course entailed introducing the students to green energy through Solar photovoltaic systems, automation using Arduino, advanced manufacturing through 3D printing and robotics. The research was conducted in secondary school students from Kangema sub-county. The target population is Form 1 and Form 2. In this research, the first cohort entailed 30 students who were selected from 3 secondary Schools through stratified, systematic and purposive sampling. The students were taken through the pre-college sessions. The study explored the impact of the pre-college sessions to the attitude learning of STEM subjects. The study established that the students exhibited an improved attitude in learning of the STEM subjects.

Keywords: Pre-college, STEM, Career progression, 3D printing, Robotics, Industry 4.0

Optimal Allocation of FACTS Devices in Power Systems Using Metaheuristics: A Review

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Abstract

The increasing power demand, the optimal use of grids, the need for economic efficiency, and the high costs associated with building new grids have created unavoidable challenges such as power line overload and excessive power transmission, voltage instability, high losses, low power quality, voltage profile problems, and reliability issues. Flexible alternating current transmission systems (FACTS) devices have proven to be highly effective and viable in mitigating the above challenges in transmission systems. However, the type, location, and capacity of FACTS devices should be properly optimized to maximize their resulting benefits. The problem of knowing the optimal type, size, and position of FACTS controllers in power systems, known as FACTS allocation problem, has attracted the attention of many electrical engineering researchers. Analytical techniques have insufficient computation precision in determining the optimal allocation of FACTS devices; also, arithmetic programming methods are often not effective in managing constrained optimization problems. On the other hand, metaheuristics approaches are random population-based optimization algorithms that are highly effective in dealing with multimodal high constraints, multi-objectives, and discrete systems. Metaheuristics are known to be the most commonly used methods to determine the optimal allocation of FACTS devices. In this paper, applications of different metaheuristics for solving FACTS devices allocation problem are deeply reviewed. The review is limited to FACTS devices and the optimal placement of these devices using metaheuristics.

Keywords: FACTS Devices; Metaheuristics; Optimal allocation; Optimization; power quality

Improving Tea Drying Energy Efficiency in a Fluid Bed Dryer

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Murang'a University of Technology

Abstract

Improving energy efficiency in tea drying is important in saving energy costs, increasing investment on energy improvement technologies, mitigating climate change effects and harnessing revenues out of carbon trading. Current implementation of such systems is limited by overreliance on conventional hot air dryers which ultimately suffer from inability to achieve desired energy efficiency. Microwave assisted hot air drying can achieve desired energy efficiency when combined in the first falling rate of drying tea in a 3-chambered JF-McCloy fluid bed dryer. However, this technology has not been well adapted for the lack of physicochemical characteristics of made tea that suits customer demands and food safety preferences amidst energy efficiency improvement. This paper presents a comparison of specific energy consumption and physicochemical characteristics of tea formed purely under hot air dryer and those formed under microwave assisted dryer. During microwave assisted hot air drying, made tea revealed a value of 3.89% moisture content dry basis, 6.06 rehydration ratio and 5.63% specific energy consumption lower than hot air dryers. Further tests in activation energy revealed microwave assisted dryer has potential for substituting conventional hot air dryers. Ultimately this system represents an alternative to hot air dryers and has the potential to improve energy efficiency.

Keywords: energy-improvement; hot-air-drier; microwave-assisted-dryer; physicochemical characteristics; specific-energy-consumption.

A Review of Wind Prediction Techniques and Optimal Storage Sizing of BESS

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Abstract

The incorporation of wind power into the grid has seen tremendous growth in many countries across the globe. This is because of the many benefits wind energy possesses such as its low cost and environmental friendliness. However, due to its intermittent and uncertain nature, its high penetration brings several hurdles in the operations and planning of the power system. It therefore becomes hard to maintain balance between power demanded and supplied at all times due to the variations of the generated wind power output. To mitigate this balance challenge and several others, the wind speed and power forecasting improvement and BESS storage have been proposed in several studies. Therefore, this paper provides a detailed review of various wind energy prediction techniques, both Artificial intelligence and traditional statistical techniques, and optimal Battery Energy Storage System (BESS) sizing considerations and approaches, providing their various competing advantages and disadvantages. Lastly, the paper identifies possible areas in wind prediction techniques and optimal storage sizing that require further exploration.

Keywords: Artificial intelligence, Artificial Neural Network, Bio-inspired optimization, Lithium ion, Wind Energy Resource

A Voltage Stability Constrained Optimal Power Flow Using Multi-objective Particle Swarm Optimization Algorithm

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Abstract

As the global demand for energy rises, power system networks are teetering on the verge of collapsing owing to a compromise in system stability. During system disturbances, the network's inability to supply adequate reactive power causes instability and eventual collapse. As such, optimized generation scheduling during system disturbances can improve the utilization of the power plants while lowering power loss, improving voltage regulation, reducing branch loading, and ensuring the secure operation of system equipment. Since power systems have conflicting and multiple objectives, this study proposes a multiobjective optimal power flow incorporating three objective functions: generation cost, power loss, and the maximum value of the line Voltage Collapse Proximity Index. The Multiobjective Particle Swarm Optimization Algorithm is used to minimize these objectives on the IEEE 30-bus system for different case studies in normal, contingency, and stressed system conditions. Fuzzy Decision Theory is utilized for obtaining the best compromise solutions amongst a set of Pareto optimal solutions. The results show that the voltage stability of the system is improved by an average of 63.09% during system disturbances with multiobjective optimization. Simultaneous optimization of the three objective functions provides the most voltage stable condition for all system conditions, preventing possible collapse.

Keywords: Fuzzy decision making, IEEE 30-bus; MOPSO; Voltage Collapse; Voltage Collapse Proximity Index

Efficient Control Strategy Based on Instantaneous Power Theory and Model Predictive Control for Grid Connected Photovoltaic System

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Abstracts

Due to the rapid decline of fossil resources and the impact of their use for electric power generation on the environment, renewable energy sources are increasingly explored and integrated into the power grid. Among the Renewable energy sources, photovoltaic (PV) systems are one of the most integrated into the utility grid. Thus, this paper presents a control scheme based on instantaneous power theory (IPT) and model predictive control (MPC) to inject the PV power into the grid at unity power factor with minimum current harmonics. The proposed control strategy is applied to a two-stage grid connected PV system which employs a boost converter and two-level voltage source inverter. The current references are obtained in the dq reference frame based on IPT. A finite control set model predictive control (FCS-MPC) is used to control the inverter current in order to inject with high accuracy the current references into the grid. The effectiveness and the performance of the proposed control strategy is confirmed by MATLAB/Simulink under various solar irradiance levels.

Keywords: grid connected PV system, instantaneous power theory, model predictive control, THD

Energy Management System for Solar and Grid System

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Abstract

Electricity is an important resource both in domestic and industrial environment. The rise in electricity demand has led to conventional resources being exhausted and possibly leads to rise in electricity prices. Since conventional resources are being exhausted, there is a need to search for alternative energy sources to supplement the conventional sources. Use of green energy as an alternative to generation of electricity from conventional sources is currently on the rise. This study aims to design and implement an Energy Management System (EMS) in a grid-tied solar Photovoltaic (PV) system. The aim of this EMS is to reduce the grid electricity needed by an ordinary consumer in Kenya and create dependency on renewable energy sources. One of the major expenses of the ordinary consumer in Kenya is the cost of electricity. Murang'a University of Technology was chosen as the case study. Arduino Uno was chosen to switch between the micro sources and the utility grid with the micro sources given priority over the

utility grid. With sufficient solar irradiation, the solar PV supplies the load power provided the load demand is met, the excess charges the battery through the charge controller. With a drop in irradiance, the battery storage system supplies the load provided the load demand is met. The grid supplies the load when the battery power drops below the load demand. With the drop in supply current drawn from the micro sources below specified threshold value, the load with the highest current rating was disconnected first and immediately reconnected to the utility grid.

Keywords: Arduino Uno; Energy Management System (EMS); Micro Grid

Motor Speed Control Kits Using a Microcontroller

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Abstract

The aim of this project is to make motor laboratory kits for AC motors. It aims on making affordable kits which are made from locally available materials and applying the obtained knowledge from the four-year curriculum I have undertaken. Initially laboratory equipment is very expensive and requires a huge amount of capital for an institution to purchase or acquire them. The methods used before used resistance rheostat to control the input voltage. (Theraja B. T., 2016) The method we have used has a great advantage, since it doesn't involve use of variable resistors to control the high-power input side of a motor. It uses the method of PWM technique to vary the speed of the motor. The PWM has high and low pulses which in turn sample the input voltage hence varying the frequency of the applied voltage high power input side. The implemented idea can even be applied in industries to control AC motors. It can also be applied in training institutions to practically educate the trainees on the field of AC motors and enable them to enhance acquired skills on the field of motors and machine drives. Arduino mega Microcontroller is used to produce the PWM for the speed control and also to interface with other components like IR, voltage and Current sensors and the LCD. The method is quite efficient and accurate in precision and also cheap to maintain.

Keywords: PWM; Affordable Laboratory Kit; Speed control; Load Voltage; Load Current

Single Axis Solar Tracking System

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Abstract

This paper is about the design and development of a microcontroller based solar tracking system. Solar energy is rapidly becoming an alternative means of electrical source in Kenya and all over the world and the solar energy becomes profitable when the solar rays are tracked with its maximum efficiency. The best way to get the maximum power output of solar array is by sun tracking. Usually solar panels are steady and always the front faces the direction the sun rises from and it is evident from the stationary mounted panels we see on buildings and other solar plants, this causes less amount of light incident on the panel. When we use the solar tracker system, it will move in the direction of the sun and get more light incident. The great benefits of solar energy are that it is sustainable, highly reliable and requires little maintenance. Therefore, came up with a system that deals with the design and construction of a solar tracking system, whereby the solar panel follows the sun as it moves. The project is based on a microcontroller which controls the system by communicating with sensors and motor based on movement of the sun, the system employs light dependent resistors that will vary their resistance depending on the light intensities, light dependent resistors gives output to the Arduino every time and Arduino processes the data and sends a control signal to the motor. Through the design, implementation, testing and results of the project, an efficient way of increasing the production of solar power is demonstrated.

Keywords: Photovoltaic System, Tracking System, LDRs, Light intensity

Multipath Clustering for Wireless Channel Modeling at 22GHz Based on Kernel Density Estimation

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Abstract

Future generation wireless communication networks require massive bandwidth to satisfy the growing data traffic. This poses a great challenge on the spectrum below 6 GHz. Millimeter wave frequency bands present a wider bandwidth to overcome this challenge. Demand for higher data rates has exponentially increased in the recent past and the trend is expected to continue into the unforeseeable future. Most of the data traffic originates from indoor environments. The closed environments are characterized by non-unique structural designs such as open space, corridor, lifts etc. Wireless channel modeling in such environments has drawn tremendous research interest to enable proper deployment of the future network technologies. This work presents a clustering approach to wireless multipath propagation in an indoor corridor. A nonparametric kernel density estimation method is applied in clustering of multipath components at 22 GHz. Measurement data of multipath components was collected through a measurement campaign in an indoor corridor using a custom made channel sounder. The observed results show that two-dimensional Gaussian kernel density estimation can be applied to predict the multipath clusters in both spatial and temporal domains of a wireless channel.

Keywords: Fifth-generation; millimeter-wave; indoor environments; future network; non-parametric

A Systematic Review on The Impact Of Educational Robots In Teaching Secondary School STEM Related Subjects

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Abstract

Educational robots have drawn a lot of interest in the education sector. The robots have been used as teaching tools in Mathematics and other Sciences. However, even though research interest on educational robots is on the rise, it seems that enough attention has not been paid to the impact they have on students' interest in STEM. This study presents a systematic review of literature on the impact of educational robotics to pre-college students. The purpose of the review is to synthesize findings from studies that provide learning experiences through educational robotics and identify the possible benefits of integration of educational robotics. In this review 25 research studies were included through search and review processes. A synthesis of the studies was done based on matching characteristics and for this case how the educational robots contribute to STEM education in pre-college levels. The review shows that educational robotics have played a great role in STEM education. The results of the review will help curriculum developers in STEM related subjects.

Keywords: Education robotics; Systematic review; STEM education; Pre-college level; teaching tool

Smart Meter Box

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Abstract

Energy meter bypassing has become a major problem for power companies especially with the newly installed pre-pay meters on SME levels in many different parts of the country. The existing low power pre-pay meter has a security system that disconnects the load from the source only when the meter is tampered with. However, that security system is limited as crooks still bypass meters without actually tampering with it. They do so by tapping energy immediately after the cut out or making joint connections on meter input lines inside the meter box. This project aims to introduce a new designed meter box that incorporates a locking system that will only allow authorized personnel with task reference number to access the meter in case of faults, else the power company is notified. The project will be powered by a 9v rechargeable battery and shall have features that will enable the company to know the exact GPS location and get updates on the security situation. I propose to use Python to build a database with an ATMEGA 32 controller, SPDT push button, GPRS and GPS modules, 3x4 keypad, 2x16 LCD screen and SMPS.

Detection and Correction of Illegal Power Connection in Kenya

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Abstract

In this research, an adaptive method for illegal power connection detection and correction in domestic distribution is presented. The focus is on a domestic supply at the meter box. Illegal power connection has been a major challenge for many years in Kenyan power distribution network. The utility company is estimated to have lost billions of dollars yearly due to illegal power connections. The company has been trying to monitor and detect illegal power connection especially on domestic supplies; however the methods used do not satisfactorily identify major cases of these connections. Socio-economic aspects are the major cause that drives the power users to indulge in illegal power usage. Due to this a cost-effective technology need to be developed not limiting to political, economic and engineering aspects to find a lasting solution that involves all power consumers' needs and more importantly considering the safety issues of the genuine power users. Several types of illegal power usage by consumers are committed but, in this research, illegally connected power users who are aware of their connection status are considered. An adaptive Neural Fuzzy Inference system (ANFIS) is applied to monitor, detect, determine and correct illegal power connection. A model hardware is implemented where several loads are connected to the system to define legal and illegal power connection while also determining the extent to which power is lost. The motivation of this research is to assist the utility company in Kenya to decrease the loss of revenue attributed by non-technical losses which is mainly due to illegal power connection by domestic consumers.

Keywords: Illegal power connection; NonTechnical Losses; Adaptive system

Automatic Face Mask Detector: A Deep Learning Approach

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Abstract

To ensure own safety and safety of others from the COVID-19 virus, medical professionals have advised on wearing face masks among other measures. Several installations have strictly implemented these protocols including Universities. Therefore, wearing a face mask has become a must to access these premises. This project uses a machine learning technique, an image classification model to detect whether one is wearing a face mask or not. Similar programs have been applied in facial recognition for many years. The model was implemented in Keras library together with image processing tools like OpenCV. The results show an accurate classification and identification of individuals wearing masks.

Keywords: machine learning; COVID-19; OpenCV; Keras; image classification

Water Bath Temperature Control Using PID Controller

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Abstract

Several ways have been used to control water temperature in a domestic setup and this remains a challenge in water management. This project aims at managing to reduce water wastage in water bath systems. This objective will be achieved by controlling the temperature in a water bath system by use of a PID controller. The first step will be to design a transfer function for the system. Second step will be interfacing the predefined PID controller with the water bath system. a heating element will be used and a thermocouple sensor in the water bath which will sense the water bath temperature. The third step will be to control the inlet water by controlling a solenoid valve which is an DC load which will be controlled by a relay through Arduino code control (Welandar,

2010). Based on the controller set constant values and temperature of the water bath, the temperature of the water bath will be controlled by controlling the amount of inlet water. Ziegler Nichols tuning method for tuning the PID controller method and performing the performance analysis of P, PI and PID controllers will be used to control the K_p , K_i and K_d values of the PID.

SUB-THEME 2: ICT FOR DEVELOPMENT AND DISRUPTIVE INNOVATIONS

Evaluation of the Impact of Empirical Risk Minimization on Supervised Deep Learning Model Generalization and Selection

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Abstract

Deep learning, a part of the broader family of machine learning methods, is increasingly finding its way into many application domains such as image and voice recognition, security, natural language processing, among others due to its ability to process large corpus of images, text, and audio data. The generalization performance is a concern for machine learning researchers and is quantified by the difference between the training error and the test error of the learning algorithm. To guarantee good generalization performance, the training error and the test error should have close values. A common approach is the technique of random projections where the original high dimensional data is projected onto a lower dimensional subspace using some appropriately chosen random matrix. The goal is to learn a function with minimal risk thus improving on the generalization of resultant models. Empirical risk minimization defines a family of learning algorithms (agnostic learning) that are used to give theoretical bounds on their performance by averaging the loss function on the training set. Consequently, empirical risk minimization helps determine a good classification and regression learning function from a bad one. In this paper, we present an empirical study on the effect of regularized empirical risk minimization methods on generalization and subsequent selection of supervised deep learning models. The Squared hinge loss and Binary cross-entropy loss functions were considered. The study focused on convolutional neural networks (CNN) commonly used in supervised deep learning tasks. Experimental research design was adopted with model experiments conducted using the CICIDS-2017 dataset. Experimental results demonstrated that the cross-entropy loss function performs better than squared hinge loss in the classification task. These results validate the impact of selecting a suitable loss function and the immense possibility of applying cross-entropy loss function to a wide variety of supervised deep learning applications in order to obtain a better classification performance.

Keywords: Cross-entropy loss; Classification; Empirical risk minimization; Generalization; Squared hinge loss; Supervised deep learning

Baggage Screening Using Color Extraction and Blockchain Algorithm

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Abstract

Threats to aviation security persist and continue to evolve. As a result, passenger and checked baggage security screening must continue to adapt to meet evolving threats and changes within the aviation industry. During peak hours in airports screeners have only a few seconds to decide whether a bag contains or not a prohibited item, and detection performance is only about 80-90%. This is a major susceptibility of air transport to security threats and illegal smuggling of goods. There is a need for the aviation authorities to consider timely sharing of screening results. The use of ICT in electronic data exchange of information over open networks in particular, requires implementation of Public Key Infrastructure to secure electronic exchange of information. The researcher developed a blockchain based security screening data exchange framework and a system that aims at providing a secure and timely mechanism of sharing travelers screening results with relevant authorities within the aviation eco-system.

Keywords: Baggage; Colour Extraction; Data Exchange; Distributed Application; Screening Process; X-Ray Scanner

The Influence of Selected Common ICT Platforms on Conflict Prevalence in Kenya

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Abstract

Information Communication Technology contributes immensely to the world economy. In Developed countries, ICT innovations are utilized for safety, economic improvement and health while in developing countries much is yet to be realized. Africa has advanced in ICT though not clear on how it enhances the people's well being apart from positive and negative causes of moral value erosion and wars. This paper sought to establish the influence of selected common ICT platforms on conflict prevalence in Kenya. Specifically, the study objectives were to establish the effect of Facebook communication and information flow on conflict prevalence, establish the information flow through WhatsApp on conflict prevalence, determine the influence of Twitter on conflict prevalence and establish the influence of Instagram on conflict prevalence in Kenya. Social exchange and innovations theories were adopted. The population of the study entailed the general public with a sample of 384 respondents sourced through media. Simple random sampling was employed to get the sample respondents. Questionnaires were formulated and sent online through the media and feedback analyzed with the aid of SPSS. Reliability of the instruments was ensured using Cronbach's reliability technique while validity was checked using content validity methods. The findings revealed a reliability coefficient of 0.83 for the overall instruments implying that it was reliable. Pearson product moment correlation and multiple linear regression models were mingled with descriptive statistics to obtain meaningful associations and ratings. The findings were presented in tables. The findings revealed that ICT platforms (social media) accounted for an overall significant variance of 72.1% in conflict prevalence. Facebook, ($\beta=.333$, $p<.05$), WhatsApp ($\beta=.329$, $p<.05$), Instagram ($\beta=.278$, $p<.05$) and Twitter ($\beta=.225$, $p<.05$) has a significant effect on Conflict prevalence in Kenya. It was concluded that the selected social media ICT platforms contributed significantly to conflict prevalence in Kenya. The findings may be helpful to stakeholders in the ICT, scholars and conflict sector in controlling disruptive innovations and managing conflicts.

Keywords: Conflict; disruptive; information; innovations; prevalence

Scalability of Distributed Ledger Technology and types of Internet-of-Things: A Systematic Literature Review

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Abstract

Increased globalization and the general availability of the Internet, low-cost Internet of Things (IoT) devices has given rise to new application use cases. Distributed Ledger Technologies such as Blockchain have seen the emergence, rapid growth, and popularity of cryptocurrencies such as Bitcoin and Ethereum, with trading and payments across borders without the need for intermediaries. While public attention has focused on cryptocurrency, Internet of Things (IoT) devices and Distributed Ledger Technology have been merging, allowing IoT devices to communicate independently without intermediaries, exchange data, trade energy, assets, and service provision while providing security, privacy, immutability, and resistance against failure and malicious nodes. Also, a new class of Distributed Ledger Technologies based on Directed Acyclic Graph (DAG) IoT Distributed Ledger Technology is gaining prominence, providing faster, cheaper, and more energy-efficient capabilities, thereby increasing the number of application use cases. However, assumptions regarding the integration of distributed ledgers technology with IoT devices, has led to many unrealistic expectations and misconceptions. In this paper, a systematic literature review is carried out on scalability of Distributed Ledger Technology based on the types of IoT device by answering the following questions. To what extent can IoT devices participate in the Distributed Ledger ecosystem? What are the key challenges of integrating IoT devices into Distributed Ledger Technologies? After reviewing the background and answering the above questions, we conclude and comment on future directions and identify possible future areas of research and how this may be used in real-world applications.

Keywords: blockchain; constrained devices; directed acyclic graph; distributed ledger technology; internet of things

A Comparative Study of the Lexicographical Complexity of Object-Oriented, Scientific and Imperative Programming Languages Based on Program Characteristics

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Abstract

Software complexity shows how complicated or complex a system or a program is to create, test, modify, maintain, and understand. Over the years, various researchers have proven that metrics are the best measure of various attributes of software products. Python, Java, and C programming languages are some of the most popular scientific, object-oriented, and imperative programming paradigms languages respectively. The aim of this study is to present a framework for a comparative analysis of object-oriented, scientific and imperative programming languages' lexical complexity. To achieve our aim, we used Halstead Complexity Metrics in sequence, selection and loop control structures in Java, C and Python. The conducted experiment showed that C programming language is the most difficult, requires the largest time to implement and more of the programmer's effort. Python on the other hand proved to be the least difficult and also the least complex in all the other Halstead complexity measures. From this study, it is evident that Python is the most suitable programming language of the three that are considered here. Other researchers can consider carrying out cost estimation from the findings of this study.

Keywords: C Programming; Halstead Metrics; Java; Programming Paradigms; Python

Assessment of Online Learning at Murang'a University of Technology

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Abstract

Online learning is a form of education in which the main elements include physical separation of lecturers and students during instruction, interaction and examination. It involves the use of various technologies to facilitate communication between students and lecturers. In the last few years, a number of universities globally have been providing online curriculum on a wide range of courses. After the World Health Organization declared COVID -19 as a pandemic, many universities were shut down thereby disrupting the traditional face to face learning in these institutions. This necessitated universities to come up with mitigating measures so that academic programs could not be severely curtailed. Murang'a University of Technology (MUT) has since been implementing online learning to ensure continuity of academic activities. However, it was largely unknown what are the practices, challenges and opportunities of online learning at the university. The study therefore sought to describe online learning practices at the university, evaluate challenges and opportunities of online learning at the university and to determine factors that affect students' acceptance of online learning as an education tool. All current students at MUT including diploma, undergraduate and postgraduates were invited to participate in the study. A total of 684 students responded. Online learning opportunities at MUT was scored at 65.8%, challenges facing online learning was scored at 81.1% whereas student satisfaction with online learning at MUT was scored at 65.1%. 22.1% of the respondents preferred online classes or blended learning over physical learning. Multivariate logistic regression analysis was done to identify significant independent factors affecting acceptance of online learning by students at MUT. Factors that were found to be significantly associated with acceptance of online learning were opportunities for e-learning at MUT (OR=1.863, p value =.002), challenges of e-learning at MUT (OR=0.388, p value <.001), satisfaction with e-learning at MUT (OR=2.271, p value <.001) and rating of e-learning at MUT (OR=1.591, p value =.002). Whereas there exist some challenges to online learning, opportunities and benefits available present a viable alternative to the face-to-face methodology of learning

Keywords: challenges, education, logistic, opportunities, practices

Towards enhancing the benefits of ICT-mediated disintermediation to cultural and heritage tourism enterprises: A conceptual framework.

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Abstract

Over the recent decades, Information Communication Technologies (ICTs) have transformed all spheres of the tourism industry, altering the industry structure and developing a whole range of opportunities and threats. This has seen ICTs become an indispensable source of competitiveness for both industry and destinations. One major result of this ICTs-led evolution has been the continued disintermediation of hitherto indispensable travel and tourism intermediaries. This has resulted in a number of benefits to the tourism supply and demand sides as power shifts away from the intermediaries providing tourism suppliers access to consumers and their information. Nonetheless, removing an intermediary from the distribution system often means that tourism suppliers have to reproduce the functionality of the intermediary's core competence, but more importantly, replicate the information flow, material flow, and knowledge flow as well as the cash flows of that particular node. In the case of heritage tourism enterprises, the fundamental question remains to what extent suppliers would take advantage of ICTs-enabled business competitiveness, and to what extent in the process, intermediaries will be eliminated from the value system. This paper provides a conceptual framework for enhancing benefits resulting from ICTs-mediated disintermediation to the CHTEs.

Keywords: Information Communication Technologies; Disintermediation; Cultural heritage tourism; Heritage Resources; heritage Supply

A Systematic Literature Review of Meta-Learning Models for Classification Tasks

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Abstract

Meta-learning is a field of learning that aims at addressing the challenges of conventional machine learning approaches such as learning from scratch for every new task. The main aim of this study is to do a systematic literature review of the existing meta-learning models that have been developed, published, and can be used for classification tasks. Systematic literature review method was used, employing a search of journal articles and publications of conference proceedings. The process involved data collection, analysis, and reporting of the results. To achieve our results, 30 primary papers published since 2016 and relevant to classification tasks in meta-learning were analyzed. Data was extracted from the papers, then we analyzed the following in each model as presented in the papers; techniques used, the contribution, and the research gap. Although a lot has been done so far in Meta-learning, the existing models are not yet optimal. They still have challenges in few-shot learning, computation time, continual learning, and generalizability across multiple related tasks.

Keywords: Machine Learning; Few-Shot Learning; Models; Learning-to-Learn; Adaptation.

A systematic review of Sign Language recognition classification algorithms

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Abstract

The research on Sign Language Recognition algorithm within the last five years makes a good interaction between human and computer systems. The relevance of automatic sign language recognition algorithm is significant since access to interpreters is not readily available thus decreasing societal inclusion irrespective of human signing or non-signing ability. The objective of this study was to identify Sign Language recognition classification algorithms, distinct steps of classification algorithms and identify their limitations. This systematic study concentrated on Sign Language recognition classification algorithms literature on five major algorithms which included K-nearest neighbors, the Artificial neural networks (ANN), support vector machine (SVM), Hidden Markov Model (HMM), and Convolutional Neural Networks (CNN). The data collected for the review focused on the principles of Sign Language recognition classification algorithms, peer reviewed journals and conferences cited and fully referenced in the period 2015 to 2019. The study revealed challenges faced by these algorithms which included evaluation, decoding and learning thus limiting to the creation of real-world sign language recognition systems. This systematic review recommends that future research should be conducted on these challenges identified in order to improve and achieve desired results and reduce societal exclusion of the hearing impaired.

Keywords: K-nearest neighbors; artificial neural networks; support vector machine; Hidden Markov Model; Convolutional Neural Networks

Comparative Analysis of Machine Learning Algorithms for Maize Leaf Disease Identification

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Abstract

The number of data points predicted correctly out of the total data points is known as accuracy in image classification models. Assessment of the accuracy is very important since it compares the correct images to the ones that have been classified by the image classification models. Image classification accuracy is a challenge since image classification models classify images to the class they don't belong to hence there is an inaccurate relationship between the predicted class and the actual class which results in a low model accuracy score. Therefore, there is a need for a model that can classify the images with the highest accuracy. The paper presents image classification models together with the feature extraction methods used to classify maize disease images. The researcher used an augmented maize leaf disease dataset obtained from the Kaggle website. Features are extracted from maize disease images and passed to the machine learning classification algorithm to identify the possible disease based on the features detected using the feature extraction method. The maize disease images used include images of common rust, leaf spot, and northern leaf blight and healthy images. An evaluation was done for the feature extraction methods and the outcomes revealed Histogram of Oriented Gradients performed best with classifiers compared to KAZE and Oriented FAST and rotated BRIEF. The experimental outcome also indicated that the random forest classifier had the highest accuracy of 0.758 compared to Logistic Regression, K-Nearest Neighbors, Artificial Neural Network, Linear Support Vector Classifier, Decision Tree, and Support Vector Machine.

Keywords: Feature Descriptor; Gradient Direction; Gradient Magnitude; Cross-Validation; Overfitting

Information Security Metrics Models: A Systematic Literature Review

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Abstract

Information security metrics models are likely to improve decision making on investment to secure information assets. The aim is to ensure justification of resources utilization for security assurance due to the explosive nature of vulnerabilities attached to the use of the internet and interconnected systems. This study gives a clear statement of the status in the information security metrics field and points towards future research areas. Systematic literature review is used as a method to select studies that discuss information security metrics models from reputable databases which include IEEE, ACM, Springer and ScienceDirect. The systematic search generated 52 articles relevant to the topic of interest published between the years 2016 and 2020. The identified articles were studied, data extracted and analyzed, presenting categorization of data which helped in underlining the research gaps. The categorization process yielded several security metrics models, each targeting different areas of security metrics. Further to this there are limitations in adoption of the identified models due to the rapid technological changes and the massive data generated in the use of internet and interconnected systems. Therefore, this study proposes that there should be efforts towards development of a composite quantitative security metrics model to give assurance of overall enterprise security.

Keywords: Information security, Security Metrics, Measurement, Management, Information Security Metrics Models

Analysis of Existing Credit Authentication Models for Credit Authorization: A Systematic Literature Review

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Abstract

Mobile loan platforms have given access to easy loans to customers. However, to access the loans, authentication of customers has become one of the main challenges. Some of the customers are borrowing far beyond their ability to repay resulting in loan defaulters. This has risen due to their ability to borrow multiple loans from multiple lenders. Also, some of the lending institutions have closed shops due to this phenomenon of double borrowing. Although extant literature reveals several authentication models, these models have some inherent limitations. Hence, to curb this problem a strong customer authentication model is required. This study conducted a systematic literature review of existing authentication models in practice and their limitations from a security perspective. The paper proposes a novel authentication framework based on blockchain technology that utilizes smart contracts to authentic borrowers to curb double borrowing. Challenges associated with using blockchain based technology are also discussed to spur further research in this area.

Keywords: Blockchain, distributed databases, double borrowing, Smart contract

Design of a Classifier for Tomato Leaf Disease Identification

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Abstract

Plants are the backbone of human existence for they are directly depended on for food. Plant infections and diseases are thus a major concern. Technology can promote food production in a number of ways through the application of computer vision technology that employs image processing to determine several aspects. Traditionally, the diagnosis of plant diseases is largely conducted by inspecting the plant for visible symptoms. The process is inconveniencing and time-consuming to the farmer. Technological advancements have given rise to better ways of protecting plants that aid in decision making. Faster and timely plant disease recognition could immensely aid in early application of appropriate treatment methods that will fundamentally reduce the economic losses. The introduction of machine learning techniques in image classification have revolutionized the digital imaging and learning systems. This study proposed a model that combines the grey level co-occurrence matrix and convolutional neural network to classify tomato plant leaf diseases into ten classes from a set of plant images. The images were first put through the GLCM texture descriptor, and then the generated GLCM images served as input into the CNN which eventually performed the classification. The model was trained and validated using 11, 000 images and achieved an accuracy percentage of 96.97%. The results suggest that the model performs better with a few iterations.

Keywords: contrast; correlation; energy; neural networks; texture.

SUB-THEME 3: NATURAL RESOURCES AND CLIMATE CHANGE MANAGEMENT FOR ENHANCED FOOD SECURITY AND NUTRITION

Does Privatizing Agricultural Extension Guarantee Downward Accountability to Small-Scale Rural Farmers?

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Abstract

This study used a case study of commodity-privatized extension in Kenya run by a farmer organization, the Kenya Tea Development Agency (KTDA) to assess the extent to which privatizing extension services would deliver downward accountability to smallholder farmers. The research collected data through focus group discussions (FGDs) with smallholder tea farmers and key informant interviews after which the information was corroborated with semi-structured interviews with 104 smallholder farmers. The research findings showed that privatization of extension services of the umbrella farmer organization, KTDA, led to the introduction of new extension approaches, previously not used, that allowed more farmers' involvement in planning, implementation and evaluation. While this transition had provided opportunities for increased accountability and empowerment of smallholder farmers, downward accountability was constrained by; presence of multiple accountabilities, a heavy top-down governance structure, higher incentives for upward accountability, limited resourcing of extension delivery, excessive workload and unrealistic targets on the part of extension staff and weak extension–research–farmer linkages.

Keywords: Downward accountability; privatised extension; smallholder farmers; farmer organization

Conservation Status of Murang'a County Wetlands, Kenya

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Abstract

Murang'a County is well endowed with water resources emanating from the large number of small wetlands strewn all over the County. However, many of these wetlands have been severely degraded and are at the risk of complete decimation if urgent measures are not taken to conserve and restore their status. In view of this problem, the Murang'a County NRF funded wetland research project sought to investigate the status of the wetlands in the county and the main challenges facing their conservation. Over a period of about 20 years, between 1986 and 2018, the area under wetland and water areas decreased by over 50% due to increased built-up area as a result of weak legislation, poor planning, lack of community empowerment, improper adjudication and encroachment. And this trend is likely to continue if no urgent measures are taken to manage, conserve and restore the wetlands to their original status. It is recommended that the County Government of Murang'a institute urgent measures to produce a legal framework that will guide in management, utilization, conservation and restoration of all wetlands in the County.

Impact of Riparian Community's Livelihood Strategies on Wetlands Conservation and Restoration in Murang'a County, Kenya

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Abstract

Wetland conservation and management in Kenya is severely impacted by human encroachment due to over-expanding human population. Wetlands, however, continue to offer many livelihood services to riparian communities including fishing, water provision, recreation, firewood collection and so on. Murang'a County, Kenya, is endowed with many such wetlands that provide

water to nearby towns such as Thika and Nairobi. Despite these important roles, wetlands in the county continue to attract little attention from scientists and policy makers geared towards their conservation and management. This study aimed at investigating the impact of riparian community's livelihood strategies on wetlands conservation and restoration in Murang'a County, Kenya. The study was conducted in four Sub-Counties. Data was collected using household's survey questionnaires, key informant interviews, and focus group discussion. A randomly selected sample of 404 respondents from the riparian community in the four sub-counties was interviewed. Data was analyzed using SPSS software version 26.0. Spearman rank correlation coefficient was used to test for relationships between livelihood strategies and impacts on wetlands conservation. Rejection value for all statistical tests was set at $P < 0.05$. Results showed an encroachment rate into the wetlands by the riparian communities of 60.4%. A highly significant and positive correlation was obtained between livelihood strategies and impacts on wetlands ($r=0.184$, p value =0.001). The study established that riparian's livelihood strategies in Murang'a County have a negative impact on wetlands. The test showed a relationship between livelihood strategies and wetlands degradation as livelihood strategies in the area were characterized by deforestation, overfishing, sand harvesting, charcoal burning, industrial activities, encroachment, overgrazing, poor waste disposal approaches and uncontrolled irrigation activities. Conservation efforts were inadequate as there was lack of knowledge about wetlands conservation programs, 70% were not aware of any wetland's conservation efforts and 73.7% had not participated in any wetland conservation effort. Hence, the study recommends a controlled riparian community's livelihood strategy leading to wise use of wetlands.

Key words: Riparian; Wetlands; Conservation; Restoration; Communities; livelihood

Effects of Enrichment Planting on Population Structure, Diversity and Canopy Cover of Indigenous Tree Species in Mount Kenya Forest, Kenya

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Abstract

The aim of this study was to assess the role of enrichment planting using indigenous trees on population structure, diversity and canopy cover in open gaps. Five selected indigenous tree species namely *Croton megalocarpus*, *Fagara microphylla*, *Markhamia lutea*, *Newtonia buchananii* and *Vitex keniensis* were investigated. The study was conducted on two sites; the enriched and control sites where systematic random sampling was applied. Five study plots 100m by 20m were established on the said sites. Data on the five study species was collected in the ten plots (sample units). Parameters of population structure, diversity and canopy cover on the enriched and control site were analyzed and means compared. Statistical tests were performed using ANOVA in Excel. There was no significant difference in overall mean tree density between the enriched and control site; $F(9, 4) = 1.19$, $p = 0.33$. Results revealed no significant difference in mean density of seedlings; $F(9, 4) = 0.64$, $p = 0.75$. There was a significant difference in mean sapling density; $F(9, 4) = 2.16$, $p = 0.04$. There was no significant difference in mean density of adults; $F(9, 4) = 1.5$, $p = 0.18$. Statistics revealed no significant difference in mean DBH; $F(9, 4) = 0.8$, $p = 0.62$. There was significant difference in mean tree height; $F(9, 3) = 2.39$, $p = 0.04$. A significant difference was noted in mean diversity; $F(1, 4) = 124.6$, $p = 0.0004$. There was no significant difference in mean canopy cover; $F(9, 4) = 0.26$, $p = 0.98$. This study established anthropogenic disturbances to markedly disrupt the forest. A combination of silvicultural techniques is therefore necessary to restore the forest.

Keywords: enrichment planting; open gaps; canopy cover; Mount Kenya forest

Adaptability of Different Potato Varieties to Different Moisture and Temperature Conditions in the Semi-Arid Areas in Kenya

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Abstract

Potato (*Solanum tuberosum* L.) is a major food crop in Kenya and worldwide as it is rich in macro and micronutrients. Lack of clean planting materials coupled with contamination of soils in the main production sites has compromised efforts to increase productivity of the crop. The main objective of this study was to determine the adaptability of different potato varieties to the semi-arid areas in Kenya for potato seed production. The experiment was carried out during the short rains of 2020 in Kangundo in lower midland agro-ecological zone 5 (LM5) and in Mitaboni, within the lower midland agro-ecological zone 4 (LM4). The plots were arranged in a complete randomized block design (CRBD) with three replicates. The blocks had a split plot arrangement with two sub-plots, irrigated and non-irrigated. Each sub-plot had 16 potato varieties in 3m by 3m subplots. Disease free rooted stem cuttings of open accessed varieties were used for planting. The differences in yield were significant ($P < 0.001$) among the cultivars tested. Three potato cultivars namely Wanjiku, Lenana and Nyota were ranked among the best performing with a yield of over 20t/ha. The least performing varieties were Mayan Gold and Desiree with yield of less than 1.5t/ha. Irrigation of the crop had a positive effect on the yield of the potato varieties. Irrigated plots had a mean of weight of 0.417g per plant while the non-irrigated plots had a mean of .0294g per plant (Standard error 0.0807). There was significant difference in number of tubers per plant ($P < 0.001$) with the highest number of tubers being recorded in cultivar Wanjiku (mean = 33.33) while cultivar Desiree had which was the lowest (mean=8.83). A significant ($P < 0.001$) and positive correlation was observed between plant height, number of stems and number of tubers on the net yield of the varieties. Early blight had a significant negative effect on yield of the crop, unlike the other pests and diseases that were associated with the crop. Findings from this study show that potato cultivars Wanjiku, Lenana and Nyota are well adapted to the semi-arid conditions in agro-ecological zones LM4 and LM5. The three cultivars are recommended for adoption for ware potato and seed production in semi-arid areas.

Keywords: Cultivar; yield; agro-ecological zone; tubers; early blight

Fish Species Composition and Diversity in South and North Mathioya Rivers, Murang'a County, Kenya

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Abstract

River Mathioya is one of the relics of the Murang'a County that forms the large upper tana ecosystem. The river covers a large range and is considered a biodiversity hotspot that hosts a large number of species both flora and Fauna. However, due to continuous anthropogenic disturbances, riverine ecosystems in Kenya, and Murang'a County in particular, have suffered from intense human interference resulting in habitat loss and degradation. Consequently, many wild fish species have become endangered even before they have been well studied. This study aimed at documenting fish species composition and diversity in the two most important rivers of Mathioya sub-basin. The data was collected for four months using seine and scoop nets. Fish samples were taken to the National Museum of Kenya (NMK) for further identification and cataloguing. A total of 296 individuals were collected belonging to 4 families, 6 genera and 9 species. The most abundant species in both habitats was *Amphilius grandis* constituting 23% of the total followed by *Garra dembeensis* (57%). Other species including *Labeobarbus oxyrhynchus*, *Enteromius neumayeri*, *Labeo cylindricus*, *Garra dembesis*, *Chiloglanis brevibarbis*, *Enteromius paludinosus*, *Clarias gariepinus*, *Pseudocranilarbus multicolor victoriae* and *Labeo cylindricus* constituted only a small proportion of the fish community in the 2 rivers. Diversity, measured using Shannon-Weiner Diversity indices indicated a high number of native fish species in the two rivers. In order to conserve the native fish species, some of which are of commercial importance such as *Clarias gariepinus*, there is no need for concerted efforts between all relevant stakeholders to institute conservation measures to prevent further degradation of the riverine ecosystems in Murang'a County.

Anthropogenic Stressors Driving Wetland Loss in Mathioya Watershed, Murang'a County, Kenya

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Abstract

Worldwide, human economic activities have led to the degradation and eventual loss of wetlands. Anthropogenic activities in a watershed often result in land use and land cover (LULC) change. This study was done in Mathioya watershed which has an area of 541 km² and extends from an altitude of 2500 to 2900 m above sea level (ASL). The objective of the study was to assess the spatiotemporal changes in land use land and land cover (LULC) in Mathioya watershed. We considered the period between 1987

and 2020. Supervised classification using maximum likelihood classifier was performed in ERDAS. The output of this exercise was LULC maps. A forecast function operated in excel was used to predict changes in wetland areas. Six LULC classes namely, forestland, wetlands, agricultural land, water bodies, built-up areas and barren lands, were identified. Analysis of Landsat images revealed that between 1987 and 2020, human activity had led to decrease in the area covered by wetlands, forestland, water bodies, and barren land by 44.8%, 33.5%, 50% and 27.3%, respectively. In the same period agricultural land and built-up areas increased by 42.9% and 84.6%, respectively. Creation of agricultural land and increase in built-up areas were identified as the major anthropogenic stressors driving wetland loss in the watershed. Between 1987 and the year 2020, 21 km² of wetlands were converted into agricultural land while 9 km² of wetlands were converted into built-up areas. It is predicted that by 2030 and 2050 respectively, the area under wetlands will decline to 12 km² and 4 km² compared to a wetland area of 16 km² in 2020. To prevent further loss of wetlands, there is a need to have a common policy on wetlands that cuts across all sectors concerned with wetland protection. There is also a need to implement the Environmental Management and Coordination Act (EMCA) cap 387. Section 12 of the Act prohibits human activities within wetlands without a permit and an environmental impact assessment.

Key words: Remote sensing; human activity; small wetlands; LULC drivers; GIS

Composition and diversity of Bird Species of Murang'a County Wetlands, Kenya

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Abstract

Avifaunal component plays a major ecological role in wetland ecosystems. Migratory water birds, for example, use wetlands throughout their range for feeding, breeding and stop-over areas across and between continents. However, the survival of many of these bird species is at great conservation threat due to the increased wetland degradation. This study sought to establish the status of bird species composition and diversity in selected wetlands of Murang'a, Kenya in order to build a case on the need for conservation of these wetlands. A total of 10,163 individual birds were sighted belonging to 204 species recorded in the seven habitats studied. There were significant differences in bird richness between habitats ($F = 7.578$, $P \leq 0.05$, $df = 6, 20$) and high diversity (H^0) ranging from 2.735 to 3.678 at all sites. Hierarchical analysis indicated that Githanji and Gakoigo dams had the highest level of similarity, followed by Ithi Ruui and Mutunguru Rivers. The high diversity of birds in these wetlands provides a strong case for their conservation and sustainable management in the County. It is therefore necessary that the Murang'a County Government urgently legislates on the methods for conservation, sustainable management and restoration of wetlands in Murang'a County.

Understanding gender differences in agricultural technology adoption: Zai technology in the dry lands of Upper Eastern Kenya

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Abstract

Soil and water management techniques have been widely tested and incessantly promoted in the drylands of Eastern Kenya as a responsive mechanism to the overarching consequences of climate change and land degradation. Empirical evidence depicts discrepancies between women and men farmers' needs and technology adoption drivers. The study, therefore, sought to determine gender-specific determinants of zai technology choice and use-intensity. A multistage sampling technique was employed in randomly selecting 133 female-headed households and 267 male-headed households in Tharaka South sub-county. Quantitative data were

collected in a cross-sectional survey using an interviewer-administered questionnaire. Using sex-disaggregated data, Chi-square and t-test statistic were employed to test the statistical significance of dummy and mean value of continuous variables, respectively. Gender specific determinants of zai technology choice and use-intensity were determined using the Heckman-two-step econometric model. The results revealed that more women farmers (44%) were using zai technology as compared to men (38%). Among women farmers, total cultivated land, access to animal-drawn farm implements, and group membership had an influence on zai technology choice. For men, total cultivated land, group membership and access to extension services positively influenced choice of zai technology. With regard to zai technology use-intensity, total land cultivated, livestock densities, group membership and frequency of training on soil and water management were important determinants among women farmers. For men, zai technology use-intensity was determined by total cultivated land and farmers' perceptions on soil erosion. We recommend that, gender-sensitive farm-level policies oriented towards farmer socioeconomic profiles are important deliberations towards choice and intense application of soil and water conservation strategies such as the zai technology.

Keywords: Male-headed households, Female-headed households, Choice, Heckman-two-step selection model

Patterns of Elephant crop raiding and damage levels encountered by farming communities in Laikipia County, Kenya

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Abstract

Crop raiding by African elephants is a conservation problem that has occurred for many years in Laikipia County, Kenya. Elephant crop raiding and damage patterns and prevalence have not been studied in the area, focusing on distinct agriculture land potential i.e. high, medium or low potential areas, despite its significance in guiding the design of appropriate mitigation strategies. In this study spatial - temporal changes in elephant crop raiding incidences and damage patterns were studied over a period of 3 years from 2016- 2018 in Laikipia County. Crop raid incidences were monitored in three study sites: Marmanet (high potential area), Kinamba (medium potential area) and Mutara (low potential area). The study sites were purposely sampled in areas of Laikipia County that experience human elephant conflict whereby farms are raided by elephants. Results showed a total of 1,209 crop raid incidences by elephants in the three study sites were recorded in 1605 farms. At least 595 hectares of crops were damaged. Over 346 hectares of maize farms were destroyed by elephants. Crop raid incidences were more during wet seasons and less in dry seasons. Crop raids incidences differed significantly between the study sites ($F_{3,32} = 19.004$, $P < 0.05$). Farm raid incidences showed a significant temporal variation; with over 60% occurring in the short wet season from October – December. This study recommends that for effective elephant control, mitigation measures be enhanced during the wet seasons. Farmers should be advised to plant fast maturing crop varieties that would be harvested before elephants raid farms. The Kenyan government, through Kenya Wildlife Service (KWS) should deploy more wildlife rangers in crop raiding hot spot areas targeted by elephants.

Keywords: Elephants; crop raid incidences; wet & dry seasons; hot-spot areas; mitigation measures

Evaluation of the quality status of African nightshade seed produced by farmers in Kenya

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Abstract

African nightshades (ANS) have become one of the most common vegetables in major supermarkets and green grocery stores in most African countries. However, farmers' capacity to meet a growing demand for these vegetables has been limited by lack of good quality seed. Seed is such an important input in crop production that it should be of high quality, pathogen free and have desired germination rate. This study was undertaken to evaluate the quality status of African nightshade (*Solanum scabrum* and *S. villosum* Miller) seed produced by farmers in Kenya. A household survey was conducted in 240 farms using a structured questionnaire to capture seed production systems and post-harvest practices that influence seed production. A total of 164 samples of farm saved, market and certified seeds were obtained during this survey. Seed samples were tested for quality and the Pearson's correlation between seed quality and germination parameters was done. The analysis showed that 50% of farmers use farm saved seed while 28% purchased seed from the local markets which have low purity and germination rates. Seed samples from different sources differed ($p < 0.05$) significantly with regard to seed purity, moisture content, seedling vigor index and germination percentage. Farm saved and seed obtained from the local market had low seed purity of 68.6 and 74%, respectively, compared to certified seed at

94.4%. In addition, only certified seeds met the recommended moisture and germination percentage as per the International Seed Testing Association (ISTA) standards. There was significant ($p \leq 0.05$ and $p \leq 0.01$) positive correlation between seed quality and germination parameters, for example seed purity had significant positive correlation ($r=0.76^{**}$) with germination percentage. This study affirms that farmers are using low quality seeds.

Keywords: African nightshade; farm saved seed; germination percentage; seed purity

Factors Affecting Small Scale Farmers Coping Strategies to Climate Change in Vihiga County in Kenya

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Abstract

Vihiga County is a rich agricultural area where various food and cash crops are grown. However, climatic changes coupled with declining soil fertility over the area have an impact on crop production, affecting food security amongst small scale farmers. The study sought to examine farmer's perceptions of climate change and factors that influenced small scale farmers in adapting to climate change. Descriptive survey design was adopted and data from both primary and secondary sources were used. Primary data included Focal Group Discussions (FGDs), questionnaires and interview schedules administered to farmers to gain information on farmer's perceptions to climate change, adaptation strategies to climate change if any and factors likely to influence their adaptation strategies. Despite these climatic changes, crop farmers have put in practice some adaptation strategies, however, they are faced with many challenges/ constraints in trying to implement them and this was attributed to certain factors. Results indicated that a majority of the farmers engaged in adaptive strategies to climate change. Out of 9 adaptation strategies that the farmers were aware of, planting of drought tolerant crops was ranked first among farm adaptive measures, while rain water harvesting was ranked as least utilized. Out of seven factors surveyed, age, education, family size, farm size, family income, gender and farming experiences were significantly related to adaptation strategies. Despite different support and technological interventions being available, lack of finances, lack of information, shortage of labour expertise were noted by the respondent as major constraints to coping with climate change effects. These results provide policy makers and development service providers with important insight, which can be used to better target interventions which promote or facilitate the adoption of coping mechanisms with potential to build resiliency to changing climate and resulting environmental impacts.

Keywords: Adaptation strategie; Climatic change constraints; small scale farmers

Effectiveness of Soil and Water Conservation and Soil Fertility Management Practices on Runoff, Sediment and Nutrient Loss in the Drylands of Tharaka-Nithi County in Kenya

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Abstract

Inappropriate land management and high rainfall intensity contributes to the runoff losses in the drylands of Tharaka-Nithi County, Kenya. We sought to evaluate the effects of integrated soil fertility and soil and water management practices on runoff losses and sediment yield in this area. A field experiment was laid in randomized complete block design with six treatments replicated four times. The treatments were manure plus fertilizer plus tied ridging under high (120 kg ha^{-1}) and low (30 kg ha^{-1}) N application rates, manure plus fertilizer plus minimum tillage with crop residue mulch under high and low N application rates, Managing Beneficial Interactions in Legume Intercrops (MBILI) with moderate (60 kg ha^{-1}) rate of N application rate, and the control. The study was conducted for four seasons (long and short rains of 2019 and 2020). Runoff volume and sediment yield were determined at the field and in the laboratory following standard procedures. Data were subjected to ANOVA and Tukey's honestly significant difference test used for mean separation at $P < 0.05$. Correlation analysis was used to determine various relationships under different treatments. Minimum tillage with mulch under high manure and fertilizer rates significantly reduced runoff volume by 41-81%, runoff coefficient

by 46-81% and sediment yield by 46-56%. Under low rates, the same treatment reduced runoff volume by 37-72%, runoff coefficient by 34-72%, and sediment yield by 44% under various rainfall depths across the seasons. Tied ridging plus high rate of manure and fertilizer reduced runoff volume by 37-85%, runoff coefficient by 46-87% and sediment yield by 46-56% across the seasons. For the same treatment under low manure and fertilizer rate, the reductions were 37-72% and for runoff volume, 34-72% for the runoff coefficient and 39-53% for sediment yield. MBILI intercrop reduced runoff coefficient by 27% and sediment yield by 44%. There was a stronger association between runoff and rainfall intensity than with rainfall depth. These practices can play a key role in reducing degradation and ensuring sustainability of agricultural productivity in arable lands in the arid and semi-arid areas.

Keywords: Soil erosion; land degradation; dry lands; MBILI intercrop; crop residue mulch

Communication Factors Influencing Adoption of Selected Soil and Water Conservation Technologies in the Dry Zones of the Central Highlands of Kenya

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Abstract

Integrated soil fertility and soil water conservation technologies are possible solutions to the low per capita food production in Sub-Saharan Africa (SSA). Nonetheless, the rate of adoption of these technologies by smallholder farmers has stagnated over the years despite being recommended. This has been attributed to the existence of wide communication gaps among researchers, extension agents and farmers. Therefore, this study aimed to assess the influence of communication factors on the adoption of the selected technologies among smallholder farmers in the dry lands of Tharaka-Nithi County. We used a cross-sectional survey design and collected data using an interview schedule from 400 randomly selected farming households. Binary logistic regression was employed for data analysis. Results showed that accessibility of extension agents after introducing the technology significantly influenced the adoption of combined organic and inorganic fertilizers ($P=0.056$), mulch ($P=0.051$), and Zai pit ($P=0.058$). Similarly, practical orientation significantly influenced the adoption of combined organic and inorganic fertilizers ($P=0.001$), mulch ($P=0.010$), and Zai pit ($P=0.003$). Information repetition significantly influenced the adoption of combined organic and inorganic fertilizers, mulch and Zai pit at p-value 0.003, 0.001, and 0.001, respectively. Training was essential for mulch and Zai pit technologies at ($P=0.030$) and ($P=0.001$) respectively, while farmer group membership significantly influenced adoption for combined organic and inorganic fertilizers ($P=0.045$) and Zai pit ($P=0.057$) technologies. Extension agents should increase their interactions with farmers after the introduction of technologies. Equally use of demonstrations should be encouraged during the dissemination of these technologies as they enhance the chances of their adoption.

Keywords: Communication factors; adoption; integrated soil fertility; mulch; Zai pits

Overview of Nitrogen Use Efficiency in Enhancing Food Security in Kenya: Progress and Challenges

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Abstract

Nitrogen use by plants and crops in particular play an important role in their growth and development but must be available for uptake in a timely and correct amount. However, soils in most parts of Kenya are low or deficient in nutrients such as nitrogen resulting in low productivity hence reducing farmers' livelihood, increasing hunger, and accelerating environmental breakdown. To

avert this, farmers result in continuous application of mineral fertilizers which in most cases are lost due to leaching, volatilization or fixed in forms that are unavailable for plant use. Further, excessive application of these fertilizers, improper timing, and/or incorrect application rates significantly contribute to environmental degradation. The application of fertilizers plays a critical role in enhancing crop yield hence averting food insecurity among households and the country at large. To maintain a balance of sustaining food security and environmental sustainability, several studies have been conducted on Nitrogen Use efficiency (NUE) in various crops. The approach used in the determination of NUE is based on agronomic efficiency, physiological efficiency and apparent recovery efficiency. These aim at optimizing nutrient resource use, saving on input costs incurred in fertilizer utilization, reducing adverse environmental impacts, and increasing crop yield. This paper gives an overview of research in Kenya on Nitrogen Use Efficiency, challenges in implementation and proposes a way forward in attaining food security through appropriate fertilizer use.

Keywords: Agronomic efficiency; environmental degradation; fertilizer application; farmer technologies; physiological efficiency.

Food insecurity a perceived barrier to healthy eating in the Lake Victoria Region, Kenya: Findings from a qualitative study

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Abstract

Consumption of poor quality diets was observed as prevalent in LM3 and LM4 agro ecological zones of the Lake Victoria region, Kenya. As a strategy to communicate desirable dietary change among consumers and influence policy in the region, qualitative food based dietary guidelines (FBDGs) were developed and consumer-tested for feasibility among community members. A total of 72 focus group discussions (FGD), each consisting of 8-12 participants were conducted among 216 school going children (10-13 years), 216 high school students (15-18 years) and 207 adult males (26-74 years) and 211 females (18-71 years) in the study area. The FGD participants were asked to state whether developed FBDGs message statements reflected their daily dietary practices? If the answer was no, they were asked to give reason to explain why their practices were not in line with the stated FBDGs? The FGD responses were coded and analyzed based on themes. Barriers to healthy eating in LM3 and LM4 zones of Lake Victoria linked to food insecurity were: low productivity due to harsh climatic conditions, lack of fences on farms, livestock diseases; unavailability of fruits and vegetables in the market; high cost of food and water treatment chemicals; low consumption of nutrient-rich foods; lack of money; low income; income derived from sale of family food produce. Despite availability of land in close proximity to Lake Victoria which is a freshwater lake, and the engagement of community members in farming and fishing, food insecurity was found to be a major barrier to healthy eating in the region. Attaining food security, a critical policy priority of the current Kenyan government, requires a sustainable use of natural resources with the adaption of resource-smart food systems approach.

Implementing Environmental Safeguards for Environmental Sustainability in Meru

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Abstract

Environmental safeguarding refers to the use of precautionary measures to ward off degradation to the environment and human health that may be occasioned during implementation of a project. The researcher identified the key challenges of environmental flow policy was the transition from high-level aspiration to actual implementation. While many countries now have some form of high-level policy and legal recognition of environmental flows, implementation has proved a significant challenge. Lack of political will and stakeholder support hindered implementation in the sense that policy changes alone didn't result in implementation. Insufficient resources and capacity implementation could not be achieved without strong institutions with sufficient resources and capacity to carry it out. Institutional barriers and conflicts of interest due to the fact that environmental flows were inherently interdisciplinary and inter-sectoral. The research objective was to determine the significance of environmental safeguards for environmental sustainability. This study was exploratory in nature and carried out in Meru County where the literature review were gathered from relevant documents published by individual researchers and questionnaires were administered to 400 sampled respondents were the main sources of data for this paper. Findings revealed that 30% NEMA officials carried out environmental

impact assessments during the planning phase; 30% UNEP Officials formulated policy guidelines in enhancing environmental safeguards for environmental sustainability and 40% Meru county residents lobbied for financial resources for environmental monitoring and evaluation of environmental safeguarding measures & dissemination of environmental information, public consultation and information disclosure mechanisms.

Keywords: Environmental sustainability, environmental safeguarding, environmental policies

Effect of Acid Treatment on the Chemical Properties of Clays from Selected Sites in Murang'a and Nyeri counties, Kenya

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Abstract

Studies have shown that adequate attention needs to be paid on processing of solid minerals that are potentially available in Kenya to address its economic problem. A primary obstacle to Kenyan economic success is the reliance on agriculture yet it is well endowed with a bulk of mineral resources. Therefore, exploitation of these natural resources could be a key factor in economic growth and development for the country. Assessing improvement on the quality of clay has been conducted by treatment with different concentrations of hydrochloric and oxalic acid. The goal of this experiment was to see how acid treatment affected the elemental composition of clays from different locations. Hydrochloric and oxalic acid were used to leach the clays at concentrations of 0.0, 0.1, 0.25, 0.5, 1, and 2M, respectively. AAS was used to determine the elemental composition of raw and acid-treated clays. Elemental composition of the acid-treated clays, in oxide form were in the ranges of 40.80- 65.16 % SiO₂, 7.16 -30.33 % Al₂O₃, 0.33-7.62 % TiO₂, 0.24-2.65 % K₂O, 0.01-1.82 % MgO. The outcomes of this study revealed that acid treatment can increase the quality of clays, allowing them to be employed as a source of raw materials for industrial applications.

Keywords: Acid-treatment, Elemental, raw materials, concentrations

Characterisation of *Fusarium* species infecting tomato in Mwea West Sub-county, Kirinyaga County, Kenya

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Abstract

Fusarium species cause various diseases of tomato such as vascular wilt by *F. oxysporum* f. sp. *lycopersici*, which causes major yield losses. The pathogen infects the xylem vessels causing water stress leading to wilting. A study to isolate *Fusarium* pathogens causing wilt in tomatoes was conducted in Mwea West Sub-county, Kirinyaga County, Kenya. This study also identified isolates of *Fusarium verticillioides* as causing wilt in the tomato plants. This was after sequencing TEF-1 α gene of 10 most virulent isolates of which four were identified as *F. verticillioides*. *Fusarium verticillioides* infects maize crop causing ear rot. This fungal pathogen has been found to infect other crops such as cotton and tomatoes causing wilting. The infection of tomato plants by *F. verticillioides* may reflect the rotation of tomato with maize in some fields, resulting in the accumulation of inoculum of this fungus and the subsequent infection of the tomato crop. There is a need for surveillance by all agricultural stakeholders in order to check the progress of *F. verticillioides* that can infect tomato and other crops. The consequences of a new disease in tomato crop would be a drop in production leading to food insecurity and loss of income for farmers who grow the crop commercially.

Keywords: *Fusarium* spp.; *Fusarium oxysporum* f. sp. *lycopersici*; *F. verticillioides*; isolation; TEF-1 α gene

Enhancement of Silicon Solar Cell Retention using Rare Earth Materials

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Abstract

Discussions on low cost, high power conversion efficiency, and high stability (long lifetime) as key metrics in solar cells have gained momentum. Importantly, the stability (percentage of retention of its initial efficiency, also called lifetime) of a solar cell brings to question the overall cost and power efficiency. The lifetime of a cell is affected by extrinsic (environmental) like moisture and oxygen and intrinsic factors like hygroscopicity, thermal instability, and ion migration. While addressing these factors has taken center stage, application of luminescence materials to enhance solar cell retention is investigated. The application of a luminescent down-shifting (LDS) layer is proposed as a method for improving the poor spectral response (SR) of solar cells to short-wavelength light. The LDS layer absorbs photons, typically in the 300–500 nm range, and re-emits them at a longer wavelength where the photovoltaic (PV) device exhibits a significantly better response. However, its impact on retention is unclear yet the advantage of these luminescent materials in diverse applications fetches investigation into among the novel improved materials with magnified luminescence properties. This study presents a detailed investigation and report on the excitation of rare-earth (RE) ions introduced in Si nanocrystals (nc) and their short- and long-term impact on its initial efficiency. RE was implanted at different temperatures ranging from 90 - 300-keV at doses in the range 2×10^{12} – 3×10^{15} /cm² followed by annealing at high temperature for 10 min to eliminate the implantation damage. Results show intense room-temperature luminescence due to internal 4f shell transitions within the RE ions. Recommendations are discussed.

Keywords: Rare-earth (RE), Solar cell retention, Silicon nanocrystals, Luminescence

Analysis of Pesticide Residues in Tomatoes and French Beans in Murang'a and Kiambu Counties, Kenya

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Abstract

Poor Pesticide-handling practices during production of tomatoes and French beans pose adverse health and environmental effects. This study was conducted to determine the concentrations of pesticide residues in tomatoes and French beans in Murang'a and Kiambu counties, Kenya. Samples were collected in farms and markets during the wet and dry seasons. Pesticide residues were extracted using the QuEChERS method and quantified using GC-MS/MS and LC-MS/MS. The recoveries of pesticides from spiked samples were within the acceptable range (70-120%) for quantitative pesticide residue methods. The linear relationship between the concentration of each individual pesticide and the GC-MS and/or LC-MS/MS detector response was excellent (i.e., $r^2 \geq 0.99$). The concentration range of pesticides residues in tomatoes were: profenofos, <LOQ to 0.18 mg/Kg; omethoate, <LOQ to 0.03 mg/Kg; indoxacarb, <LOQ to 0.05 mg/Kg; chlorantraniliprole <LOQ to 0.11 mg/Kg; spirotetramat <LOQ to 0.01 mg/Kg; and metalaxyl <LOQ to 0.02 mg/Kg. The concentration range of pesticides residues in French beans were: imidacloprid <LOQ to 0.29 mg/Kg; chlorantraniliprole <LOQ to 0.37 mg/Kg; spirotetramat <LOQ to 0.01 mg/Kg; indoxacarb <LOQ to 0.05 mg/Kg; and metalaxyl <LOQ to 0.02 mg/Kg. The concentrations of these pesticides were within the Maximum Residue Levels (MRL) set by the Joint FAO/WHO Food Standards Programme and/or the European Union except for omethoate (banned for use in fruits and vegetables) which had concentrations higher than MRL in 29% of the analyzed samples. Significant seasonal variations of pesticide residues, attributed to climatic conditions, were observed in the study area. The study recommends routine monitoring of pesticide residues in tomatoes and French beans, development of integrated pest management protocols and sensitization of farmers on good agricultural practices to minimize health risks to consumers.

Key words: Pesticides; residues; tomatoes; French beans; health effects; vegetables

The Potential of Avocado Seeds and Peels as Animal Feed Supplement

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Abstract

Avocado is a tropical fruit crop grown in Kenya for subsistence, local markets and export. Kenya is ranked the 3rd highest producer of avocados in the world yielding about 81,000 t per annum. The fruit is widely regarded today for its nutritional value as it is rich

in vital nutrients for the human body. There is a global tendency towards food processing and which results in release by product waste to the environment. This study was aimed at recycling avocado waste to prepare an animal feed mineral supplement. The samples were collected randomly from Thika and Murang'a regions during the month of June to August when the fruits are in season. Determination of minerals was carried out where potassium and sodium were analyzed using flame photometry, while calcium, zinc, magnesium, copper, iron, and manganese were analyzed using atomic absorption spectrometry. Potassium and sodium were the highest in concentration in both seeds and peels with values (mg/100g) 111.20 to 493.00 in seeds and 155.50 to 500.60 in peels of K, 157.70 to 181.30 in seeds and 198.90 to 200.80 in peels of Na. A mineral supplement was then prepared from avocado seeds and peels. The efficacy of the feed was tested by preparing various feed rations which were fed to the rats for one month. The performance of the rats to the food rations was determined by weighing the rats on a weekly basis. From the results, it can be inferred that the seeds and peels of avocado could be an important source of minerals for animals if properly harnessed. The toxicological and anti-nutritional aspects of the avocado fruit waste should however be tested before feeding the animals.

Keywords: Waste; Processing; Nutrients; Minerals; by-product.

Mineral fertilizer uptake improves rural welfare: Evidence from smallholder sorghum farmers of Western Kenya

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Abstract

Smallholder farmers are confronted with many hurdles as they try to improve their crop productivity. These include deprived soil fertility and climate shocks. Mineral fertilizer has been promoted as a key intervention for improving soil fertility. The utilization of “poor man’s crops” such as sorghum could enhance rural welfare since they are drought resistant. Despite the potential of mineral fertilizer and orphan crops to improve rural livelihoods, there is a dearth of insights from smallholder farming systems in Kenya. This study evaluated the determinants and effects of mineral fertilizer uptake on sorghum yields. We used survey data collected from 300 households in Siaya County, Kenya. We analyzed the data using propensity score matching and endogenous switching regression. We observed high rates of mineral fertilizer uptake, but smallholders applied low nitrogen amounts. We found that extension, farmers’ perceptions, labor, hybrid variety, location, and climate information were the main determinants of mineral fertilizer uptake. Both propensity score matching and endogenous switching regression established that mineral fertilizer uptake increased sorghum yields. Our findings implied that utilization of mineral fertilizer on orphan crops could significantly uplift rural wellbeing. Though the mineral fertilizer uptake increased yields, the outcomes were lower compared with the production potential in Kenya. Policymakers should consider the provision of subsidized fertilizers and hybrid sorghum seeds for the full realization of production potential.

Keywords: Rural livelihood, orphan crops, improved production, endogenous switching regression, sub-Saharan Africa

Tuning Physicochemical Properties of Nitrogen Doped Carbon Nanotubes

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Abstract

Carbon nanotubes (CNTs) have attracted a lot of interest in recent times due to their unique properties (mechanical, thermal and electrical), and have potential application in field –effect, transistors, hydrogen storage, capacitors, fuel cells and photovoltaic among many others. Doping CNTs with heteroatoms such as boron and nitrogen have been shown to introduce structural changes, chemical and electrical properties. In this study physicochemical properties of Nitrogen-doped carbon nanotubes (NCNTs) were tuned by varying the concentration of boron source, during synthesis using chemical vapour deposition at a temperature maximum of 850 °C.

Acetonitrile and 4-[[pyridin-4-yl)methylidene]amino]phenyl]ferrocene was used as the Nitrogen source, 4-[[pyridin-4-yl)methylidene]amino]phenyl]ferrocene also acted as the catalyst and toluene as the carbon source (acetonitrile and catalyst were also extra source of carbon). Shaped carbon nanomaterials (SCNMs) obtained were characterized using Transmission electron microscopy (TEM), Field emission scanning electron microscopy (FESEM), electron dispersive X-ray spectroscopy (EDX), and elemental analyser. Hall measurements were used to determine the bulk carrier properties of NCNTs. TEM results show that two types of SCNMs were synthesised, that is NCNTs and carbon spheres (CS). NCNTs were observed to have bamboo-shaped morphology in their internal surface which was used as a qualitative indicator that nitrogen doping was achieved. It was also observed that the formation of other shaped carbon nanomaterials (SCNMs) was found to be carbon source dependent. Elemental analyser shows that a maximum of 17.5% of nitrogen doping was achieved with acetonitrile. Hall measurements gave a negative value for NCNTs suggesting that its n-type conductor.

Keywords: Nitrogen doped carbon nanotubes, 4-[[pyridin-4-yl)methylidene]amino]phenyl]ferrocene; Bamboo morphology

Insecticidal Constituents of *Ocimum Kilimandscharicum* Guerke Acclimatized in Kakamega Forest, Kenya

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Abstract

The genus *Ocimum* belongs to the Lamiaceae family and is made of almost 200 species of herbs and shrubs which have potential medicinal properties. The species are native to the tropical and temperate climate zones around the globe. Two new compounds with damarane skeleton namely 2 α -hydroxy-3-oxodammara-20,24-diene (**1**) and 2 α ,3 β -dihydroxy dammara-20, 24-diene (**2**) together with apeginin-7-*O*-neohesperidoside (**3**), quercetin (**4**), turkesterone (**5**), fesitin (**6**), apeginin (**7**), chrysin (**8**), lupeol (**9**), stigmasterol (**10**), friedelin (**11**), α -amyrin acetate (**12**) and n-octacosonic acid (**13**) are reported here from the leaves of *Ocimum kilimandscharicum*. Their structures were established on the basis of physical and spectroscopic analyses and by comparison with the literature data. Crude extracts and isolated compounds were investigated for contact toxicity and anti-feedant activity against *Sitophilus zeamais* and *Prostephanus truncatus*.

Keywords *Ocimum kilimandscharicum*, Lamiaceae, Contact toxicity, Anti-feedant activity

Modeling Infant Mortality Risk Factors Using Logistic Regression Model and Spatial Analysis in Kenya

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Abstract

Globally, infant mortality is used as an indicator for health care and socioeconomic status hence becoming an important tool for evaluation and planning of public health strategies. Despite numerous interventions by governments and Non-Governmental Organizations aimed at reducing infant and child mortality, high infant mortality rates are still being reported in Kenya. A lot of public resources and individual efforts have been channeled towards its control which has led to low productivity hence impacting on the household economic welfare and the national GDP. Many studies have focused mainly on neonatal and maternal mortalities and more need to be done on infant mortality which is equally a major problem in Kenya. Infant mortality hotspot areas have not been fully identified and this study sought to determine the spatial variation of infant mortality in Kenya. The specific objective of this study was to describe socioeconomic, biodemographic and environmental factors that are associated with infant mortality, to determine infant mortality risk factors using logistic regression model and to determine spatial variation of infant mortality in Kenya due to socioeconomic, biodemographic and environmental factors. A fully Bayesian paradigm was used to determine the spatial variation of infant mortality in Kenya while logistic regression model under the frequentist approach was used to determine infant mortality risk factors by analyzing the relationship between maternal education level, marital status, occupation, religion, household wealth index, birth order, mother's age at birth, type of birth, preceding birth interval, breastfeeding habits, infant's size at birth, infant's gender, place of residence, place of delivery, source of drinking water, and the type of toilet facility and infant mortality. Maternal age, household wealth index, marital status, maternal education level, occupation, region, source of drinking water, the

type of toilet facility, and religion were found to have significant effect on infant mortality. Infant mortality is high in arid and semi-arid areas and coastal areas due to high prevalence of infectious diseases and inadequate water supply, health facilities and low education levels. Counties from the northern parts of Kenya, Rift Valley, Central, Eastern, Nyanza, Coastal and Western parts of Kenya showed a high level of infant deaths.

Key words: Mortality; logistic regression; spatial analysis

Modeling conditions of storing quality commercial eggs

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Abstract

Egg storage has subjected poultry farmers and egg retailers to losses resulting from inadequate methods used. These methods include various models with statistical analysis of the storage conditions on the egg quality. However, they do not provide sufficient information. This study evaluates the effect of storage temperature at three levels (5°C, 19.5°C, 30°C) and storage duration at four levels (2nd, 12th, 22nd, 32nd) on the egg quality using fixed-effect and mixed-effect models. We collected a total of 618 fresh and unfertilized eggs from ISA (Institut de Sélection Animale) brown layers. The egg quality was determined by the changes of physical characterization under different levels of storage conditions. Restricted maximum likelihood and analysis of variance methods were used to determine the efficiency of fixed and mixed effect models. Results showed that the determinants of egg quality were significantly affected under 5°C, 19.5°C and 30°C ($P < 0.05$). The effect was more adverse on eggs stored at 30°C within 32 days. Storage temperatures of 5°C and 19.5°C led to a substantial reduction in the Haugh unit, total egg weight and weight of the egg white. It increased the weight of the yolk, the diameter of the egg white under storage time intervals. Eggs should be stored in fridge-freezers for up to 32 days, at (19.5°C) up to 14 days, and at (30°C) for 7 days only. Further, the fixed-effect model was appropriate in modeling albumen height, Haugh unit, albumen diameter, egg weight loss, yolk weight, and shell weight as compared to the mixed effect model ($P < 0.05$). This study suggests that the fixed effect model is the most appropriate for randomized complete block design experiments.

Keywords: Chicken egg, experimental design, fixed model, mixed model, variance component

Spatial Modeling of Malaria Prevalence in Kenya

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Abstract

Malaria is one of the leading causes of deaths in Kenya. Malaria is a vector-borne disease caused by a parasite of the genus plasmodium. Complete eradication of malaria in the country has remained a problem. A lot of effort and resources has been put in the fight against malaria in developing countries which has led to underdevelopment and low human development index. Malaria burden affects the world's poorest countries. About 90% of the malaria burden is reported in sub-Saharan Africa. The disease has led to high mortality cases in children and pregnant women. Despite the massive government eradication campaign, new and resurgent cases have been recorded. The specific objective was to determine the malaria risk factors and spatial distribution in Kenya. The 2015 malaria indicator survey data was used for the study. Demographic and social-economic factors were used as predictor variables. A generalized linear mixed model was used to determine the spatial variation and prevalence of malaria in Kenya. Demographic and social-economic factors were found to have significant impact on Prevalence of malaria in Kenya. Most cases of malaria were reported in lake, western and coastal regions. The most prone areas were Kisumu, Homabay, Kakamega and Mombasa. There were fewer cases in central Kenya counties like Nyeri, Tharaka-Nithi with a significant number reported in arid and semi-arid regions of Northern-Kenya counties of Garissa, Mandera, Baringo. Rural population was more susceptible to malaria compared to those in urban areas. The odds of getting (verse not getting malaria) in places of residence increases by 1.32, which is estimated to .28, CIs 95% (1.01, 1.72), and a p-value .04. Malaria prevalence varied significantly from one region to another. The study established that Spatial autocorrelation exists among regions mostly due to weather patterns, geography, cultural practices and socio-economic factors.

Keywords: Autocorrelation; Bayesian-Approach; Malaria prevalence; spatial-Modelling; Variation.

Effect Of Addition Of Coffee Extract On Microbial Growth And Functional Properties Of Coffee Flavoured Yoghurt.

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Abstract

Yoghurt is a popular probiotic milk product. Coffee flavoured yoghurt has been developed to enrich the product with functional properties and help improve local coffee consumption. The aim of the research was to study potential interaction of polyphenolic compounds present in coffee flavour on the viability of lactic acid bacteria, the physicochemical and functional properties of coffee flavoured yoghurt. Coffee flavoured yoghurt was prepared by adding coffee flavour extract to the yoghurt in varying amounts; 0.0%, 0.1%, 0.2%, and 0.3%. Treatment 0.0% was the control. A complete randomized design (CRD) was used, in which yoghurt was divided into 4 treatments in triplicate and was randomly assigned to 12 experimental units. The sampling for analysis was done at intervals of one week for 28 days from day one. Microbial analysis was done using standard AOAC 2016 method using MRS medium and results were reported as CFU/ml of the coffee flavoured yoghurt. Functional properties were determined by evaluation of total polyphenols and antioxidant activity using the Free radical scavenging activity by DPPH method and Folin ciocateau method. Data was analyzed by use of ANOVA, means separated by LSD at $p < 0.05$ level of significance. From the findings, lactic acid bacteria in coffee flavoured yoghurt ranged between 3.7×10^7 - 1.09×10^8 CFU/ml. Yeast and moulds ranged between 3.6×10^1 - 8.33×10^0 . TPC between 5.76 ± 0.4 - 97.89 ± 0.6 mgGAE/ml while Antioxidant properties ranged from 15.82 ± 0.9 - 68.55 ± 0.9 % DPPH. In conclusion, addition of coffee flavour into the yoghurt improved the keeping quality of the yoghurt while maintaining its probiotic potential.

Key words: coffee extract, yoghurt, microbial, functional, physicochemical properties.

Characterization of Black Nanosilver Doped TiO₂ Prepared by In Situ Method

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Abstract

Black nanosilver doped titanium dioxide (Ag-TiO₂) nanoparticles (NPs) were prepared for the first time using the sol-gel technique. TiO₂ is a suitable nanomaterial for photocatalytic degradation of water pollutants due to the hydroxyl radical. The sol-gel method was employed due to its ease of operation, cheap, versatile, and better morphology. The physical, optoelectronic, morphology and photocatalytic properties were investigated. The X-ray diffraction (XRD) results confirmed the presence of the anatase phase in all the samples. Ultraviolet-visible spectroscopy (UV-Vis) spectra showed that the bandgap narrowing caused by Ag doping increases photocatalytic operation in the visible light region significantly. Scanning Electron microscopy (SEM) results revealed that the particles were spherical-like in shape while energy dispersive spectroscopy (EDS) analysis confirmed the presence of the anticipated elements. Photoluminescence (PL) results indicated that the peak intensities decreased with an increase in the amount of dopant. The sample obtained at 3.2 mol % of Ag exhibited the highest photoactivity during the oxidation of the brilliant green dye (BG). The study provides a simple route to synthesize a single anatase phase for photoactivity and advances its enhanced properties.

Keywords: Degradation; morphology; optical properties; photocatalyst; surface area

Drimane Sesquiterpenes from Warburgia Ugandensis with Insecticidal Properties on Zea mays Pests

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Abstract

Sitophilus zeamais and *Prostephanus truncatus*, the destructive pests of maize in Africa, cause extensive tunneling in maize grain leading to conversion of maize grain into flour within a very short time. Small-scale farmers are often forced to sell maize shortly after harvest to minimize losses during storage, thereby attracting low prices and compromising food security. Most available

pesticides have adverse effects on the environment and humans. The aim of this study was to evaluate the efficacy of extracts and compounds of *Warburgia ugandensis* in controlling *S. zeamais* and *P. truncatus*. Chromatographic fractionation of extracts from *W. ugandensis* afforded 7 α -acetylugandensolide (1), ugandensolide (2), polygodial (3), warbuganal (4), ugandensidial (5), mukaadial (6) and muzigadial (7). The structures of the compounds were determined using spectroscopic and physical methods. n-Hexane extract was the most repellent among the extracts while polygodial (3) was the most repellent compound against the two pests. n-Hexane and ethyl acetate extracts caused 76.3-78.3% and 71.1-75.0% deaths of the insects respectively. Polygodial (3) and warbuganal (4) caused 64.3-70.0 and 61.7-65.0% deaths respectively. n-Hexane and ethyl acetate extracts, polygodial (3) and ugandensolide (2) significantly inhibited the emergence of the insects. The findings from this study show that extracts from *W. ugandensis* are effective in controlling maize insect pests.

Keywords: Zea may, Insect pests, Repellence, Mortality, emergence inhibition

Health Facility Factors Influencing Secondary Prevention Practices among Type 2 Diabetes Mellitus Patients in Meru County, Kenya: A Hospital Descriptive Correlational Study

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Abstract

Diabetes Mellitus (DM) is a chronic metabolic disorder of multiple etiologies that results from a deficit in insulin production, insulin action or both. As a chronic metabolic disorder affecting millions of persons worldwide the ailment takes a huge toll on human resources as mismanagement leads to the development of acute and chronic complications. Long term chronic complications of DM include the development of eye retinopathy, foot ulcers and neuropathy, heart diseases and nephropathy. Patients can prevent the development of these complications by adopting secondary prevention measures. These include regular screening for cardiovascular diseases, having cholesterol level check-ups, eye screening for retinopathy annually, doing foot examination in every visit as well as checking urine for albumin. With an increase of patients suffering from chronic DM complications, these practices are often not adopted by a number of patients coupled by a number of impending clinical factors. The study sought to assess the health facility factors influencing secondary prevention practices among Type 2 Diabetes Mellitus patients at Consolata Hospital Nkubu and Meru Teaching and Referral (Level Five) Hospital in Meru County, Kenya. Data was collected from 357 participants who were sampled purposively in both hospitals. A descriptive correlational study design was adopted with questionnaires and Focus Group Discussion Guide used as the data collection methods. Quantitative data was analyzed using SPSS version 25 at 95% confidence interval. The distance to the facility ($p=0.011$), waiting time ($p=0.062$), availability of drugs ($p<0.001$), good staff reception ($p=0.001$), receiving health education and counseling ($p<0.001$), good care-giver communication ($p=0.038$), availability of DM services, ($p=0.001$) availability of supplies for screening DM complications ($p<0.001$), and client satisfaction ($p<0.001$) all significantly influenced T2DM secondary prevention at a p value ≤ 0.05 . In reducing the burden posed by the chronic diabetes complications these factors need to be addressed to promote T2DM secondary prevention practice.

Keywords: Health facility factors; Type 2 diabetes mellitus; Secondary prevention practices; Kenya

The Impact of the Novel CoronaVirus in Education: Salient features learnt in primary School Institutions of learning, Kenyan perspective

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Abstract

Globally, and Kenya in particular, economic growth has been and will be negatively impacted by Coronavirus Virus Disease of 2019 (COVID-19) which caught the world unaware. World governments continue to face serious problems due to the outbreak of COVID-19 which broke out in Wuhan, the capital city of Hubei Province in China in December 2019 and spread rapidly across the World. In retrospect, most governments worldwide reacted by imposing lockdowns to control the disease. In Kenya, the outbreak of coronavirus disease (COVID -19) led to the closure of schools countrywide to reduce the risk of spreading the virus where a large number of learners gather for classes. The closure not only disrupted the academic calendar but also caused the social, economic, and cultural crisis. This led to the buildup of mental stress and anxieties among education stakeholders. The aim of this paper was to investigate the effects of COVID -19 amongst primary school learners in Kenya and establish salient features learnt in primary school institutions of learning. There was a need to navigate through the effects of COVID-19 to ensure continued access to provision of quality, equitable and inclusive education during and after the pandemic, and propose interventions by education managers and stakeholders to ensure uninterrupted learning in educational institutions in future. This being a theoretical review, it relied on review of secondary data material to discuss the challenges and mitigations for COVID-19 in the Kenyan education sector, with specific reference to primary schools. Classical Liberal Theory of Equal Opportunities advocated by Sherman and Wood and the theory of justice and fairness advanced by Rawls John guided this theoretical review

Key words: Pedagogy, online learning, technology, change

Post-Covid-19 Pandemic Period: A Time To Embrace And Explore Further Online Teaching And Learning Possibilities Or Revert To Traditional Systems

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Abstract

The COVID-19 pandemic has changed education forever. The pandemic resulted in schools shut down all across the world. School closure affected more than 1.2 billion children in 186 countries. Teaching and learning drastically changed to e-learning whereby teaching was undertaken remotely and on digital platforms. Research suggests that online learning has been shown to increase retention of information and take less time. Some are wondering whether the adoption of online learning will continue to persist post-pandemic. This article is based on literature review. In the recent past there has been noticeable investment in education technology evidenced by a number of online platforms for example BYJU's which offers free access to their services with 200% increase in the number of new students using its product. Other platforms with large scale remote services include Tencent, Lark, DingTalk and Alibaba cloud among others. Other most popular online communication platforms that would change the destiny and direction of the whole education system across the world in post COVID-19 circumstances include Start.me, Neo, Classtime, Classwise, ClassDojo, Edmodo, Ted-Ed, Coursera, Blackboard Learn, Parlay, Docabo, Feedback fruits, Udemy, Google classroom, Bak-pax, Pronto, Skillshare, We Video, WizIQ, Flipgrid, Codecademy, Gynzy, Adobe Captivate, Seesaw, Edx, GoGuardian, Elucidat, Kami, Pluralsight, G Suite, Otus, Articulate-360, Floop, Future Learn, Heparo, Shift, Lectora Inspire, Kialo Edu, Buncee and Lanschool, among others. The proliferation of education technology platforms suggests that post-COVID-19 period would witness a widespread integration of online teaching and learning in a majority of educational institutions. Also there is evidence of huge investment in global Edtech such that in 2019, it was estimated at US\$ 18.66 billion and expected to reach US\$ 350 billion by 2025. These trends indicate an ongoing adoption of online teaching and learning even post-the pandemic period. While smartphones and laptops are key resources for learners to access digital learning, research indicates participation gap across countries and between income brackets within countries. The conclusion is that in the post-pandemic era, education would continue to experience a pedagogical shift, from traditional method to the modern approach of teaching –learning, from classroom to digital platforms, from personal to virtual and from seminars to webinars.

Keywords: online teaching and learning; post- COVID-19 pandemic; possibilities; embrace; traditional educational systems

The policy dimensions of the digital teaching learning process in public learning institutions in Africa

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Abstract

The recent outbreak of COVID-19 disrupted learning and restricted only to institutions of higher learning which had better ICT infrastructure in Kenya. It exacerbated inequalities and pre-existing problems within the education system. In particular, not all the institutions of higher learning were able to operationalize their digital teaching and learning. Digital exclusion is thus one of the key drivers that spread of COVID19 is digital exclusion. Policy makers have encouraged learning institutions to leverage digital teaching and learning to achieve their strategic objective of excellence, inclusion and a flourishing community and also to increase access to education through technology adoption. This is because education promotes the development of their personality, talents and ability to the fullest. This paper looked at institutional responses to guarantee teaching learning processes across the east African region using global data bases. The study focused on infrastructure and equipment, internet connectivity and preparedness of instructors to develop distance learning materials. The study used primary, secondary data and documentary reviews for the period 2000 to 2020. The results showed limited preparedness across all income groups. We therefore concluded that inclusive educational and ICT policies should support the government and the public response capacity across all income groups. The study recommended increasing government support to these institutions by lowering tax rates on digital learning devices. Promotion of public private partnership between the institutions and promoting through suggested increased significant

Keywords: Institutions, exclusion, income, teaching learning, infrastructure.

Perceptions and experiences of online teaching and learning by private primary school teachers in Kiambu County during Covid 19 pandemic in Kenya

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Abstract

The global education system has been badly impacted by the COVID-19 pandemic, with schools and colleges/universities being forced to close due to government orders in an effort to contain the pandemic. Traditional classrooms were replaced with online classrooms, which had a significant impact on teachers' and students' closed interactions, resulting in a paradigm shift in the teaching-learning process. Against such a backdrop, it is relevant to analyze the perception and experience of online learning by private primary school teachers in Kiambu during the ongoing COVID-19 pandemic. The present study used a quantitative and sample survey approach. The respondent sample of 150 private primary school teachers from 15 private primary schools teaching grades 4 to grade 8 were sampled and data collection done through questionnaire. The study was conducted in Kiambu County in the months of February and March 2021. The result shows that 74 (35%) of teachers used zoom platform to deliver content, 41 (20%) used Google meet as a platform of choice in teaching, 31 (15%) used Voov meeting, 14 (7%) used Youtube, 22 (10%) used Facebook application in teaching while 28(13%) used WhatsApp as a platform of choice in teaching. The study found that 114 (54.2%) had difficulty setting up an online system during lessons while 96 (45.8%) were competent enough to set up the online system. The current study established that 92 (43.8%) of teachers teaching in private primary schools preferred delivery through online learning than offline learning while 105 (50%) preferred offline learning and 13 (6.2%) of teachers did not give any response on that question. Majority of the respondents 173 (82.4%) believe that online classes increase technological literacy for pupils while only 37 (17.6%) did not perceive that. Majority 72.3% of respondents believed that the online methods of course content delivery and pupil-content interactions did not meet teachers' expectations. The rate of respondent's agreement on perceived usefulness, perceived ease of use, and acceptance of e-learning was (70.1%, 72.5%, and 82.4% respectively). The highest barriers to online learning were insufficient/unstable internet connectivity (60.9%), inadequate computer labs (35.2%), lack of computers/ laptops (31.9%), and technical problems (19.5%). As a result of the findings of this study, policymakers and educational institutions will be empowered to handle online classes more effectively by adopting the most up-to-date techniques and continue building capacity by continuously training teachers so that the teaching-learning pathway becomes more enjoyable and effective during such an ongoing pandemic.

Keywords: COVID-19; experience; online learning; pandemic; perception, private primary schools; teaching.

Diffusion of COVID-19 misinformation in Kenyan Twitter Conversations

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Abstract

As an increasing number of Kenyans rely on social media platforms for COVID-19 information, identifying misinformation has emerged as a critical task in these unprecedented times. Twitter, as an organization, alongside, individuals, media organisations and government agencies have created hashtags that provide information on the pandemic. This paper set out to explore the role of Twitter conversations on the spread of misinformation about the COVID-19 pandemic in Kenya. The objectives of the study were: (i) to determine the main areas of misinformation in relation to the COVID-19 pandemic, (ii) to identify the sources of misinformation on Twitter, (iii) to find out how misinformation is diffused to the public by examining the Twitter hashtags formed in relation to the pandemic. The study was guided by the rumour theory. In this study, we adopted a descriptive survey design which allowed the researchers to collect data without interacting with participants and to collect data using existing online records. The study gathered data from hashtags and tweets related to COVID-19 in Kenya from March 2020 to April 2021. The hashtags and tweets were collected using the Twitter API for geolocated tweets. The study targeted 16 hashtags and 200 tweets relating to COVID-19. Quantitative data was analysed using descriptive statistics while qualitatively data was analysed using content analysis. Findings indicate that none of the hashtags created by Kenyans was framed to spread misinformation but the tweets under the different hashtags contain misinformation. Findings also indicate that verified Twitter handles were involved in either creating or spreading

COVID-19 misinformation. Additionally, false claims diffuse faster than partially false claims as observed in the tweets with misinformation. Compared to a background corpus of COVID-19 tweets, tweets with misinformation were more often concerned with discrediting other information on social media. We recommend that the government and stakeholders in health ought to counter COVID-19 misinformation online, and to equip users with basic literacy skills regarding consumption of online information while continuously monitoring online discourses.

Key words: Covid-19; diffusion of information; hashtags; rumour theory, social media

Beating Odds in Post Pandemic Times: Opportunities in Hosting Sports Tourism Events

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Abstract

The Novel Coronavirus pandemic has brought unprecedented impacts on different sectors of economies in countries across the globe, sports tourism being the worst hit. Sports tourism events are important vehicles of development and mostly embedded in the development plans of many countries. They have been associated with promotion of socio-economic well-being to the host communities. Despite the widespread of the pandemic, most countries are on the road to recovery by adopting resilient measures to revamp the worst hit tourism industry. Kenya has hosted the World Rally Championship this year as a post pandemic measure to promote sports and tourism industries. The purpose of this paper is to bring to the limelight the benefits of hosting this event in Kenya amidst the pandemic to the host community. The paper adopted a qualitative research design whereby 12 key sports and tourism stakeholders were interviewed during the event hosting period. The results indicated that despite the pandemic, the event generated both social and economic benefits to the hosts. Key recommendations were made.

Key words: Sports tourism, events, Covid 19, effects, opportunities

Adjusting Academic Library Services to Covid 19 Prevention Protocols

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Abstract

The Covid 19 pandemic has presented challenges in the provision of library services in academic libraries. The pandemic has affected the mode of library operations and therefore librarians had to shift to virtual library services and also adopt new ways of providing their normal physical library services while observing Covid 19 prevention protocols. Due to these unexpected challenges, this study finds out the type of library services offered, working patterns and strategies applied by academic libraries in Kenya in response to Covid 19. Google form questionnaires were administered to librarians in ten academic libraries. A structured interview was also conducted to five librarians in the same selected academic libraries. The study found the majority of the libraries have adjusted their services and facilities to the Covid 19 prevention protocols though frequent cleaning of the main reading areas have been overlooked. Libraries have also adopted the use of virtual library services in dissemination of most of electronics resources but the main challenges hindering improved transition to virtual services are poor library infrastructure and slow internet connection, lack of adequate skilled staff, lack of support in purchasing of core e-books, e-journals and e-newspapers. During the academic institutions closure, librarians were relying on provision of online resources and this was faced with barriers of digital divide and unaffordable internet access among users. Library working schedules changed and librarians had to reduce their operating hours to adjust to the national curfew guidelines. The study recommends initiatives to be adopted by academic libraries in order to meet user information needs during and after Covid 19 pandemic period.

Keywords: Covid-19 Pandemic, Virtual Library Services, E-resources, Remote Access Services, Academic Libraries.

Conspiracy between Covid-19 and Education in Selling of Water to Buy Drought in the Rangelands

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Abstract

On March 15, 2020, the Kenyan government indefinitely closed all teaching and learning institutions in response to Covid-19, disrupting nearly 17 million learners countrywide and, resulting in limited learning. The closure of institutions not only affected the learners and teachers but also brought forth numerous economic and social crises, including childcare challenges, increase in teenage pregnancy cases and, amplified financial cost implication at household and community levels. The arid and semi-arid regions which largely house pastoralists procured a fair share of the deleterious consequences. The Maasai pastoralist community of Kajiado County, Kenya, whose means of livelihood is presently characterized by a dwindling asset base, decreasing incomes, human welfare deterioration, and low-return non-pastoral engagements were led to adopt enhanced unsustainable survival techniques, such as sand harvesting, to complement pastoralism. Primary school pupils were among the sand harvesters motivated by desire to make cash. The gist of this study was to explore the influence of the Covid-19 pandemic restrictions period and the consequent suspension of face-to-face primary schools operations in Iloodokilani and Imbirikani/Eselenkei Wards of Kajiado County, where sand harvesting is prominent. The principal objectives of the study were to establish the drivers of the pupils' engagement in sand harvesting activities and examine the resultant effects on pupils' school attendance. The data collection instruments were questionnaires which targeted class teachers, pupils, parents and sand loaders. The study found that in the Covid-19 restrictions period, 3% of the boys got immersed in sand harvesting practices, essentially to earn an income, with about 45% of them getting associated with the 206 schoolgirl teenage pregnancies in the study locations. The involvement of the adolescent boys in ferrying away sand raised the number of sand collecting trucks, levitating the quantities of water trucked out of the seasonal rivers, volumes with potential to meet an annual human water demand in the study area. With resumption of classroom learning, 25 of the school boys doing sand harvesting continued to partake in the activity, steering them to absenteeism from classes.

Key Words: Pastoralist; Livelihood; Diversification; Sand harvesting; Teenage pregnancies;

Tourism Industry Transformation in the Wake of Covid-19 Pandemic in Kenya: Best Practices, Opportunities and Challenges

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Abstract

The Coronavirus pandemic has disrupted the socio-economic development of many countries in the World, including Kenya. Tourism is one of Kenya's key economic sectors that Covid-19 has negatively impacted, leading to under-performance of various tourism and hospitality value chains. This has had a sharp decline in jobs as a consequence, thereby putting the local livelihoods in adjacent parks and the local and national economies at stake. This paper is based on the review of secondary data to explore the trends in the tourism and hospitality industry in the wake of Covid-19 by analyzing the national and international visitor trends in Kenya. Considered were trends in job opportunities before and after the Covid-19 outbreak, measures undertaken by the national and county governments and relevant actors to mitigate the pandemic, and the available opportunities for improving the tourism and hospitality industry performance during the pandemic and post recovery period. The recovery path is uncertain for the industry and much depends on appropriate policy stimulus from the county to the national levels and incentives and promotional activities by different actors in the industry. Efforts to enhance resilience to Covid-19 include vaccination programs, education and awareness, government financial support for refurbishment of hotels and lodges, and cushioning of Kenya Wildlife Service scouts respectively.

Keywords: Covid-19 disease; Hospitality; policy; socio-economic development; well-being

Covid-19 Pandemic: Opportunities and Challenges in the Tourism Industry

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Abstract

The global Covid-19 pandemic has generated multiple opportunities and challenges in the tourism sector. The major aims of this paper are to explore the opportunities and challenges that the Covid-19 pandemic has presented to the tourism industry. For these aims to be achieved, the researchers analyzed 50 articles. The articles analyzed were published from 2020 in the Taylor & Francis Online journal. The study results revealed that the tourism industry has been severely affected by the Covid-19 pandemic thus leading to massive job losses and loss of revenue. However, the study also revealed that the Covid-19 pandemic also presented some opportunities for the tourism industry majorly in the improvement of the usage of digital platforms to market and promote tourism activities. It also emerged that travel and tourism contributed to the spread of the disease and also experienced some of the worst consequences of the pandemic. The imposition of Covid-19 control measures especially lockdowns and cessation of movement protocols have made hotels to be closed and airlines to be grounded. Consequently, innovation and digitization in the tourism sector has been stimulated to ensure the tourism industry remains resilient and bounces back to profitability. The findings of this study will foster new understanding on the challenges and opportunities of Covid-19 in the tourism industry.

Keywords: Airlines, Crisis management; Digitization; Tourism recovery strategy; Resilience.

Social Cultural and Economic Factors Affecting the Practice of Secondary Prevention among Patients with Type 2 Diabetes Mellitus at Consolata Nkubu and Meru Level Five Hospital in Meru County

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Abstract

Diabetes is a chronic metabolic disorder characterized by states of hyperglycemia with disturbances of carbohydrates, fat and protein metabolism. Diabetes affects millions of people globally every day and the prevalence of the disease is on the rise due to unhealthy diet and lifestyle. The disorder usually results in chronic complications including cardiovascular diseases, diabetic nephropathy, diabetic neuropathy, foot ulcers and diabetic eye diseases that are all preventable through secondary preventive measures. Once an individual has been diagnosed with T2DM, secondary preventive approaches are essential in preventing the occurrence of chronic complications. However, lack of awareness of these measures has been cited as the common reasons for the development of complications. The study aimed to assess the effect of social cultural and economic factors on the practice of secondary diabetes prevention among patients with Type 2 Diabetes Mellitus (T2DM) at Consolata Hospital Nkubu and Meru Level Five Hospital between March and April 2019. A descriptive correlational study design was adopted to collect data from 357 purposively sampled participants with T2DM using questionnaires and Focus Group Discussion Guide. Quantitative data were analyzed using SPSS version 25 at 95% confidence interval and a significance level $p \leq 0.05$. Most respondents attended Meru Teaching and Referral Hospital. Majority of the respondents were aged between 40 - 60 years. Most respondents 31.6% had a secondary level of education and the majority 67% was employed. Concerning secondary prevention, the majority did foot examination on every visit 70.6% and BP monitoring 69.5% while 56.5% did annual eye screening. Level of income, affordability of services, health insurance cover of the patients, monthly cost of DM management and traditional beliefs in managing DM all significantly influenced DM secondary prevention at a p value ≤ 0.05 . The factors need to be addressed to reduce the global burden posed by the disease.

Keywords: Type 2 Diabetes Mellitus, Secondary Prevention, Economic Factors, Cultural Factors, Chronic Complications

WhatsApp as a platform for participating in sexual and reproductive issues for women with disabilities in Kenya

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Abstract

Socio-cultural, political and legal practices hinder women with disabilities from accessing sexual and reproductive health (SRH) information. This study assessed the use of WhatsApp for SRH information among women with disabilities in Kenya. The objectives of the study were to examine the frequency of use of WhatsApp for sharing SRH information by women with disabilities, the effectiveness of the WhatsApp platform in sharing SRH information, the attitudes towards SRH information for women with disabilities and the challenges experienced by women with disabilities regarding access to SRH information. The study was guided by Uses and Gratification Theory. The researchers adopted both quantitative and qualitative approaches. A random sample of 20

women with disabilities who are members of WhatsApp groups in Kenya were issued with questionnaires. A purposive sample of 6 women with disabilities who were found to be information rich was interviewed. Quantitative data was analysed descriptively, while qualitative data was analysed via thematic content analysis. WhatsApp was found to be an effective platform for sharing SRH information among women with disabilities. Four major themes on SRH were featured in WhatsApp discussions: sex education, sexual pleasure, stereotypes and awareness. Few respondents however agreed that WhatsApp has helped them to understand sexual and reproductive health information for women with disabilities with an overwhelming majority of the women highlighted the need for WhatsApp administrators to invite experts to elaborate on sexual reproductive health issues for women with disabilities. WhatsApp was found to be inefficient in sharing SRH to women with other types of disabilities such as blindness, intellectual disability and Deaf Blind. The study recommends that more structured discussion should be conducted on disability WhatsApp groups, with experts being invited to discuss SRH issues. SRH information should be shared in ways that are accessible to people with other types of disabilities. This includes platforms that support visual, pictorial, and audio forms. Further, the government, in partnership with other stakeholders, ought to disseminate SRH information through social media to women with disabilities.

Keywords: Sexual and reproductive health, women with disabilities, WhatsApp, participation

The journey to online teaching in Kenyan University Education: Opportunities and challenges

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Abstract

COVID-19 has left no aspect of modern life untouched, and higher education is no exception. It has challenged the higher education sector in sub-Saharan Africa in many new and unexpected ways as many countries around the world closed schools, colleges and universities to halt the spread of the virus. The pandemic has created an unprecedented test on the rigidity of education systems across the globe. The Government of Kenya announced the first case of COVID-19 on 13 March 2020 and the President, through an executive order, closed all learning institutions on 16 March 2020. Secondary sources of information enlightened the findings discussed and triangulated with those from a panel of experts drawn from the Ministry of Education, university management, students' counselors and teaching staff in Kenyan universities. The themes considered in the study are delivery of teaching and assessment, preparedness of teaching staff, enrollment rates, quality of education, the demands on university resources, access to ICT infrastructure and mental health challenges. There are mixed results on the implications of transition of teaching/learning processes to online platforms as a requirement of COVID-19 regulations. Universities that had strong and well-established e-learning support departments adjusted faster to the new mode of teaching/learning as anticipated while the main reason for enhanced performance was facilitation for access to the internet. This was further reinforced by the level of preparedness of the teaching staff for online mode of delivery. The enrollment rates did not however significantly increase as expected with a significant number of the students reported with mental health challenges as compared to a face-to-face mode of learning. Overall, the digital divide that portrays the implications of the economic status of the students' backgrounds is the main cause of the varied results in the online mode of university education.

Access to Health Information for Persons with Disabilities during the Covid-19 Pandemic in Kenya

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Abstract

This study explores the effectiveness of media in promoting access to COVID-19 health information in Kenya. The focus will be on how persons with disabilities accessed COVID-19 information through television within the first three months of the outbreak of the pandemic in Kenya. The quantitative study sampled three television stations in Kenya namely KTN News Television, Signs TV and KBC Television. Data was collected from the television stations between April and June 2020. Further, a survey of 100 persons with disabilities was conducted to triangulate study findings. The data gathered was analyzed descriptively. Findings indicate that, although television was a popular medium in transmitting COVID-19 information, it didn't employ accessible formats as is required by local and international legal provisions. The authors recommend that a more disability inclusive approach to the COVID-19 health information dissemination in the media be adopted. Further, media regulators such as the Communications Authority of Kenya and the Media Council of Kenya, are encouraged to enforce the legal provision to include accessible formats on television.

Key words: COVID-19, persons with disabilities, television, access to healthcare information, communication in healthcare, effects of media, Kenya

The Use of Social Media by Government in Covid-19 Management in Kenya: Opportunities and Challenges

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Abstract

Social media has become an essential tool for government communication during the Covid-19 pandemic. New links between the government and citizens are being formed, with each group relying on the other to combat the pandemic. Despite considerable research interest in the intersection of social media and government, little is known on how governments use social media to manage Covid-19. This exploratory study aimed to investigate how governments used social media in Covid-19 management, focusing on Kenya's Ministry of Health and its Twitter usage. Qualitative data was collected through content analysis from the Ministry of health's official Twitter account (@MOH_Kenya) from 30th June 2020 to 30th June 2021. Overall, 1345 tweets were retrieved and analyzed using the thematic analysis method. Six primary themes were identified, indicating that the Government of Kenya used social media to communicate: important public health messages, plans and measures, regular updates on the pandemic, humanitarian and community cohesion, and surveillance messages, while misinformation control was the most prevalent challenge. The government now has opportunities to promote public awareness of Covid-19, boost surveillance, improve public preparedness, manage government reputational effects, and increase accountability and transparency while fostering public confidence through social media communication. The study concludes that social media has been beneficial in government communication during the pandemic. While there are obvious benefits to using social media for government communication during Covid-19 when reaching a larger population is critical, the government must monitor social media users, and the information exchanged to ensure quality and reliability, avoid information overload, and misinforming the public. To increase public engagement, information penetration on Covid-19, and a more inclusive policy process, the government should acknowledge the constraints of its voice and pursue prospects to collaborate with more influential voices in the community.

Keywords: Kenya, Government, Social Media, Covid-19, Opportunities

The Level of Awareness of Autism Spectrum Disorder (ASD) in Private and Public Primary School Teachers: Evidence of Murang'a East Sub-County

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Abstract

Autism spectrum disorders (ASDs) are described as a set of diverse neurological and developmental disorders, the main features being differences in social interactions, sensory differences, emotional or behavioral differences and poor communication skills. It is important that teachers are aware and are able to identify specific special needs among their students. The objective of this study was to assess the level of awareness of autism spectrum disorder in private and public primary school teachers of Murang'a East Sub-County, Murang'a. A 30 item questionnaire tool was developed to assess the teacher's knowledge and perception of Autism. This tool included likert scale type of questions measuring attitudes and respondents' capacity to make fine distinctions of the various special needs disorders. Data was entered and analyzed using IBM SPSS version 26. From the study findings, teachers who participated in the study showed limited understanding in the differentiating features of Autism in both private and public primary schools. The teachers showed various misconceptions about different aspects of special needs. In conclusion, we recommend relevant special needs mainstreaming agencies to have a comprehensive framework of training for teachers, working in mainstream schools on how to identify, distinguish different features of special needs children and how to manage their respective conditions.

Keywords: Autism, Knowledge, Perception, special needs, teachers

Effect of covid-19 on performance of Saccos in Kenya

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Abstract

Most economies globally have been adversely affected by coronavirus (COVID-19) pandemic. They have experienced massive job losses, increase in poverty levels and decline in Gross Domestic Product (GDP). However, there is little documentation on the effects of pandemic on performance of Saccos in Kenya. As a result, the study sought to establish the effect of COVID-19 pandemic on Sacco performance. Specifically, the study sought to determine the effect of Covid-19 on business operations, customer relations and employee relations on performance of Saccos in Kenya. The study was anchored on resource-based view theory. Positivism research philosophy was adopted. The study population comprised 164 Saccos in Kenya from which a sample of (30%) 49 respondents were selected using stratified sampling technique. Data was collected using a semi-structured questionnaire and analysed using descriptive statistics and inferential analysis. It was established that a negative significant relationship exists between business operations, customer relations, employee relations and Sacco performance due to Covid-19. The study recommends that the management of Sacco should carefully consider their business operations, employee relations and customer relations during the Covid-19 pandemic as it significantly affects their performance. The study will be relevant to the management of Saccos who are directly involved in the management of Saccos and their members who have invested their resources by helping them to understand the effect of COVID-19 pandemic on performance of their Saccos.

Keywords: Business operations; Customer relations; Employee relations; Firm performance; Performance

Impact of Covid-19 pandemic on renewable energy use by manufacturing Companies in Kenya

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Abstract

The Outbreak of Covid-19 pandemic in the late 2019 brought with it new social formations and practices that had an impact on energy consumptions and demand. The measures imposed by the Governments to contain the spread of the virus such as lockdowns and curfews, restriction of movement, working from home and limited working hours brought in unprecedented challenges and opportunities to the various sectors of the various economies. The manufacturing industries in Kenya were not spared by the pandemic and the containment measures taken by the Kenyan government. Demand for the manufactured goods declined according to a report from the Kenya National Bureau of statistics. There was a sudden great decline in commercial and industrial demand for the electricity. The investments and the supply chains of the energy resources and distribution were greatly disrupted. However, there was demand for energy for those companies that were producing medical products and personal protective equipment that were meant to combat the pandemic. This paper examined the impact of Covid -19 on the use of renewable energy by the manufacturing industries in Kenya. Overall, the paper brings in new thoughts on the emerging opportunities with renewable energy use despite the challenges the manufacturing industries face following the outbreak of Covid 19. The study used ex-post facto research design. Primary data was collected through a questionnaire administered and collected from a sample of 25 registered manufacturing companies in Kenya between 2019 to 2020. For testable conclusion, companies were stratified into three sizes, large, medium and small size. The responses were considered valid and reliable since they were audited and discussed in the Annual General Meetings. In order to establish existence of linear relationship and the strength of the relationship, a multiple regression analysis model applied for this research was $E = a_0 + \rho_1 X_1 + \rho_2 X_2 + \rho_3 X_3 + \rho_4 X_4 + e$. The study concluded that there is a strong positive linear relationship between the cost of production and electricity cost before and during Covid -19 period. This is evident since the computed multi regression output $R^2 = 0.3522$ while the adjusted $R^2 = 0.312$, the F-statistic being 2.738. The study recommends the use of renewable energy by the manufacturing industries should be enhanced. The energy produced is environmentally friendly. The extra energy generated by the Page 2 of 5 manufacturing companies can be sold to the consuming community at a reasonable cost. The initial cost incurred can be reduced with the savings made in the long run.

SUB-THEME 5: ENTREPRENEURSHIP AND COMMUNITY DEVELOPMENT

Application of Public Private Partnerships within Nairobi Metropolitan region for entrepreneurship and community Development

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Abstract

Infrastructure is essential for meaningful growth to take place and the availability of finance has often been cited as one of the inhibiting factors for its development. Kenya requires infrastructure investments worth over US\$ 4 billion annually but little has been provided towards the same over the years. Governments have realized the importance of working together with the private sector, including through Public Private Partnerships, in the designing, financing and provision of infrastructure because its provision supports the growth and development of industries, service delivery and ensuring the safety and comfort of citizens which guarantees entrepreneurship and community development. The study objective was to investigate the applicability of Public Private Partnerships in infrastructure development in the Nairobi Metropolitan region. It was found out that PPPs, when structured in an effective manner, by aligning and balancing interests of partners, provide opportunities for infrastructure, community and entrepreneurship development. It was proved that there is an enabling legal, regulatory, institutional and policy environment for PPPs application in accelerating development of infrastructure in Kenya. 81% of the respondents sampled indicated that PPPs is useful and important in accelerating infrastructure development, but cited several challenges that faced its application, including inadequate awareness of how PPPs can be structured, capacity, inadequate institutional frameworks and inadequate project financing. It was recommended that Kenya should embrace PPPs for infrastructure development, where financing, technological, managerial expertise and appropriate risk transfer skills are operationalized.

Key Words: Infrastructure; Kenya; Public Private Partnerships.

Technology and Innovation Strategic Integrated Ticketing and Sustainable Mobility of Matatu SACCO's in Public Transport Sector in Nairobi County, Kenya

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Abstract

The significance of Matatu Sacco sector in economic creation cannot be gainsaid. The sector is the fifth largest contributor of formal employment and the fourth largest contributor of the informal job creator in Kenya. The overall aim of the study was to assess the relationship between strategic integrated ticketing and sustainable mobility of Matatu Saccos in Nairobi County, Kenya. The study was guided by positivism philosophy, where census approach was assimilated and a descriptive research design was adopted. The study applied Cronbach Alpha coefficient to test reliability and validity of the tools used in the research. Questionnaires were used to collect data from 177 Sacco Managers from all the 177 Matatu Saccos in Nairobi County. The questionnaires were dropped and picked later. Structured interview guide was also used to collect data from one representative from both MOT and VOA respectively. Data was analyzed using descriptive statistics and SPSS. Pearson's correlation indicated that integrated ticketing has a strong positive and significant relationship on sustainable mobility of Matatu Saccos in Nairobi county Kenya ($\beta=0.809-t=15.872$ p value <0.05). The study findings further articulated that use of single ticketing enhances customer satisfaction. Conclusions drawn from these findings indicate that allowing customers to pay in advance is more reliable, faster and safer as passengers can book their journeys from any location at any time. Further the study recommended that the Government and the Sacco management should enhance further improvement through the implementation of E-ticketing to increase attractiveness of the Matatu Saccos.

Keywords: Advanced Ticketing; E-Ticketing; Integrated Ticketing; Single Ticketing; Sustainable Mobility

The Relationship Between Consistency, Entrepreneurial Orientation and Performance of Christian Church Owned Hotels in Kenya

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Abstract

The purpose of this study was to determine the relationship between consistency, entrepreneurial orientation on performance of Christian church owned hotels (CCOH) in Kenya. Consistency has captured interest because of its important relationship between the concept itself and its outcome such as gaining competitive advantage and performance. Entrepreneurial Orientation is key as it determines the success or failure of Hotels. There is little research that has been done on the relationship between consistency, entrepreneurial orientation and performance of hotels. The study was guided by the use of Denison's organizational model and used the mixed methods approach guided by a cross sectional survey research design. The population of the study included 1950 members of staff from 24 Christian Church owned hotels in Kenya and the sample size comprised 394 respondents. The data was analyzed using descriptive and inferential statistics. Consistency was found to have a positive and significant influence on the performance of CCOH ($\beta=.103$, $CR=2.120$, $p\text{-value}=0.034$). The analysis found that there is a relationship between Consistency, Entrepreneurial Orientation and Performance of CCOH. Based on the MMR model a significant change in R was found due to addition of the interaction term ($R\text{-square change}=0.049$, $F\text{-change}=4.191$, $P\text{-value}=0.046$). With this, a conclusion was drawn that there is a significant relationship between consistency, Entrepreneurial Orientation and performance of Christian Church owned hotels in Kenya. This study is important to Christian Church owned hotels because it will guide in inculcating entrepreneurial culture.

KEY WORDS: Consistency; Entrepreneurial Orientation; Organizational performance

Legal Framework and the Adoption of Cross-Network Mobile Money Transfer Service by Small and Medium-Sized Enterprises (SMEs) In Murang'a Municipality

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Abstract

Mobile money interoperability is aimed at ensuring that customers from different networks would be able to seamlessly send and receive funds directly across all networks and drive financial inclusion because mobile money transfers should neither be prohibitive or discriminatory. Greater convenience in cross-network mobile money transfers is expected to encourage customers to sign up for smaller operators. With interoperability arrangements, money received from rival networks will reflect in real-time as cash available for use in their mobile wallets. The uptake of interoperability has remained low in Kenya. The goal of this study, therefore, was to establish how the existing legal framework affects the adoption of cross-network mobile money transfer services in Murang'a municipality. Descriptive survey design was used to conduct this research. Primary data was obtained through questionnaires from a sample size of 250 participants using a purposeful sampling design. Descriptive and inferential statistics were used to analyze data. The findings showed that the adoption rate of cross-network mobile money transfer services was very low as only 36 % of the respondents had adopted the service at the time of the survey. This was attributed to unawareness, lack of agent interoperability, loyalty, exclusive trust in M-Pesa, network challenges, and limited access by customers to other mobile operator's retail outlets. Respondents strongly agreed that the legal framework influenced their decision to adopt the service. The study also established that the adoption of cross-network mobile money transfer services had escalated the performance of the businesses as revealed by a majority of respondents (71%). The study recommends that SMEs traders adopt cross-network mobile money transfer services because of their positive impact on business performance; policymakers introduce interoperability at the agent level and conduct aggressive marketing to increase the adoption rate of the service; the service providers to raise transaction limits of mobile money to attract more users in Kenya and need to review transaction costs downwards.

Keywords: Agent interoperability; legal framework; mobile financial services; mobile money; SME

Tourism Industry Transformations in the wake of Covid-19 pandemic in Kenya: Best Practices, Challenges and Opportunities

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Abstract

The Coronavirus pandemic has disrupted the socio-economic development of many countries in the World including Kenya. Tourism is one of Kenya's key economic sectors that Covid-19 has negatively impacted, leading to under performance of various tourism and hospitality value chains. This has had a sharp decline in jobs as a consequence, putting the local livelihoods in adjacent parks, the local and national economies at stake. This paper is based on the review of secondary data to explore the trends in the tourism and hospitality industry in the wake of Covid-19 by analyzing the national and international visitor trends in Kenya. Considered were trends in job opportunities before and after Covid-19 outbreak; measures undertaken by the national and county governments and relevant actors to mitigate the Covid-19 pandemic, and the available opportunities for improving the tourism and hospitality industry performance during the pandemic and post recovery period. The recovery path is uncertain for the industry and much depends on appropriate policy stimulus from the county to the national levels; incentives and promotional activities by different actors in the industry. Efforts to enhance resilience to Covid-19 include vaccination programmes, education and awareness, government financial support for refurbishment of hotels and lodges, and cushioning of Kenya Wildlife Service scouts respectively.

Keywords: Hospitality; Covid-19 disease; socio-economic development; policy; well-being

Investigating the Relationship between Pricing Strategies and Value Proposition Environment Focusing on Electricity (KPLC) in Murang'a County, Kenya

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Abstract

Electricity is a commodity that is used by all and hence pricing strategies and value propositions are needed. Pricing strategy has various approaches: competition-based pricing, cost-plus pricing, dynamic pricing, penetration pricing, price skimming and value pricing. A value proposition comprises four aspects; cost value, quality value, customer satisfaction and continuous improvement. Reviewed literature indicates research in this area however; the relationship between pricing strategies and value proposition environment focusing on electricity in Murang'a County, Kenya has not been fully addressed. The study adopted a mixed design approach, with a questionnaire as the research instrument. The target populations were respondents from select respondents (residents), the private sector, and employees of Kenya Power & Lighting Company PLC Murang'a County. Data was analyzed using Pearson's correlation coefficient to infer a relationship between the variables. The results of coefficients to the model $Y = 3.298 + 0.452X_1 + 0.372X_2 + 0.287X_3$ indicated that pricing strategies was found to be statistically significant at the 0.05 level of significance. This implied a positive relationship between the variables to inform the industry in this area amidst COVID-19 pandemic. Further research in a different sector may be carried out using similar variables.

An Assessment of Employee Engagement and Transformational Leadership Perceptions for Organizational Performance in the Banking Sector in the Face of COVID-19

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Abstract

Employee engagement construct has gained scholarly interest in the recent past as practitioners link it to organizational performance. Scholars seek how organizations would obtain the best value from their employees amidst COVID-19 which has caused many challenges. Reviewed literature indicates a strain on employees due to the requirement to do more with less resources resulting in work stress and dissatisfaction. Transformational Leadership is one of the antecedents of employee engagement. However, employee engagement and transformational leadership perceptions for organizational performance in the face of Covid-19 have not been addressed extensively. This paper sought to fill this gap to add to existing literature and to inform organizations in this area. The overall objective was to assess employee engagement and transformational leadership perceptions for organizational performance in the Banking Sector in the face of COVID-19. The research design was mixed and the instrument was a questionnaire. The target population was the banking sector, and the sample was purposively chosen to be one branch of KCB. There were (9) respondents with one supervisor which was 60% and adequate for analysis. Data was collected and analyzed using descriptive statistics and inferential statistics, specifically Pearson's correlation coefficient was used to test relationship. A positive relationship between employee engagement and transformational leadership was established at .014. Further employee engagement and organizational performance correlated at .210. This indicates a perceived strong relationship. The conclusion is that employee engagement and transformational leadership perceptions are important in the performance of the organization in the face of COVID-19. This is an

opportunity to utilize transformational leadership to engage employees to improve organizational performance. Further research on the variables in a different sector would be beneficial.

Keywords: Employee Engagement; Transformational Leadership; Organizational Performance

Effects of Quality Management on Performance of County Governments in Kenya

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Abstract

The purpose of this study was to evaluate the effect of quality management on performance of county governments in Kenya. The data collection instrument used was Questionnaire. The questionnaire collected primary data from seven counties in Kenya (Machakos, Kakamega, Murang'a, Kilifi, Migori, Nakuru and Nairobi) drawn from 47 county governments in Kenya. The researcher identified the best performing county from every region of the former eight provinces of the republic of Kenya. The study adopted correlational research design. The study adopted two tools of analysis namely: correlation and regression analysis. The correlation analysis portrayed the positive correlation between the predictor and the response variables. Regression analysis was used to explain the relationship between the predictor and response variables. To provide the strength of the relationship between the model and the response variable and determine its goodness fit, R-squared was used. F statistics was used to test the significance of the regression model. The findings articulated that quality management reported an insignificant effect on the performance of county governments in Kenya. From the findings, the study recommends that the county governments need to embrace actions that advance quality management as these are critical strategic dimensions in defining county government performance. The study concludes the need for further improvement in the area of quality management in order to enhance its benefit on the performance of county governments.

Keywords: Approach; Continuous; Efficiency; Improvement; Focus

Assessment of the effect of Moderated Internal Audit Practices on Financial Performance of NSE Listed Banks

Ruth Mwendu, Clifford Machogu, Grace Njogu, Dennis Otieno
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Abstract

The study evaluated the key drivers of enhanced auditor's performance in the NSE listed banks in Kenya. The study posited that work environment, auditor's competence, independence and authority have not significant effects on their audit performance in public universities in Kenya. It used a descriptive case study to analyze the impact of the three variables on performance using likert collected responses. The results established that internal auditors, working environment and compliance with professional standards are the most important contributors to internal auditing and formal auditing standards and its independence and authority positively influenced their auditing performance. Internal auditors contribute to the improvement of risk management, control and governance using a systematic and disciplined approach in the public sector. To enhance auditor's performance and mitigate adverse corporate governance issues requires that the universities offer auditors independence and authority in the management protocols and establish an internal audit unit to undertake periodic audits. To facilitate faster delivery of audit services including the detection and prevention of frauds and/or non-compliance with public expenditure management, the public universities should provide a conducive work environment that enables the use of cutting edge ICT technology to support auditing functions, promote continuous training and develop institutional mechanisms (e.g., enforcement, auditing, or corporate governance structures) to encourage compliance with international standards.

Keywords: auditor; independence; compliance; environment; objectivity.

The Contribution of Entrepreneurship Ecosystem in Inculcating Entrepreneurial Propensity for Community Development in Kenya

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Abstract

The focus of this research was to establish the effect of entrepreneurship Ecosystem in inculcating entrepreneurial propensity for community development. Promotion of entrepreneurship in Kenya has existed ever since independence. The Government has shown tremendous support for entrepreneurship growth. The Government has channelled financial support through funding such as Women Enterprise fund, Youth Enterprise Fund and Uwezo Fund. Other forms of Government support include improved infrastructure, introduction of entrepreneurship education in all institutions of higher learning, as well as enhancing security in the country. Nevertheless, community underdevelopment has continued to excruciate. This research proposed to investigate whether the entrepreneurial ecosystems play any role in determining community development. The determinants of entrepreneurial ecosystems include Government Policy, Financial availability, Human Capital and the state of the market. The population under study was individuals operating Micro Enterprises within Nyeri Town. Out of 478 Micro Enterprises business owners were selected. A statistical formula was used where 236 were taken as a sample size which is within the acceptable sample. The theories that form the bases of this study include Economic theory, Psychological Theory and Sociocultural Theory. A questionnaire was administered out of which 212 responded. Data was then analysed using SPSS. The findings indicated that Government policies contribute 0.77 in inculcating entrepreneurial propensity. The research indicated a strong correlation of 0.79 on the contribution of the financial access in inculcating entrepreneurial propensity that would enhance community development. The research also indicated a moderate positive correlation of 0.65 on how human capital contributes in inculcating entrepreneurial propensity for community development. The state of Markets indicated a moderate correlation of 0.63. The findings have been reported in tables. Out of the research findings, the researcher recommended the need for the Government to relook the already existing Government policies and rectify those that are retrogressive to entrepreneurial propensity. The research revealed that although the Government has availed finances they are available but not accessible due to the rules and regulations of borrowing. Kenya is a Human resource intensive Nation, unfortunately, the existing Human Resource are uneducated and unskilled. The study recommended entrepreneurship training, not only at the Institutional levels but also to the already existing business persons. Environmental dynamisms can be made more facilitative toward entrepreneurial propensity to enhance Community Development. Since entrepreneurship Education has been introduced in all high levels of Education, future researchers can consider the effect of entrepreneurship Education in Kenya. Regression analysis model was used in this study, future researchers can consider use of Chi-square and determine similarities or differences in the findings.

Keywords: Desirability; Ecosystems; Feasibility; Self-Efficacy; Self-employment

Effect of on-the Job Training Technique on Job Performance at Murang'a University of Technology in Kenya

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Abstract

On-the-job-training of employees is a big challenge to employees and specifically those working in universities in Kenya. This situation affects employee job satisfaction which in the process affects staff stability in institutions as employees may seek other jobs that may employ more flexible on the job training strategies. Training impacts positively on employee's job satisfaction as when employees develop better skills, knowledge, abilities, competencies they get more settled at work and enhance their performance. Performance is greatly reliant on employee skills. The main purpose of this study therefore, was to explore the effect of job rotation on employee job satisfaction at Murang'a University of Technology. This study was premised on the Goal Setting theory (1968). The study adopted the quantitative research design. A sample size of 222 respondents was drawn from a total population of 319 employees at Murang'a University of Technology in Kenya. Data was collected using questionnaires. The quantitative data collected was analyzed using descriptive statistics. The results showed that on-the job training techniques have a great impact on employee job satisfaction. The study, recommends that: Universities should have an effective job rotation programme for all employees as it greatly affects their job satisfaction; University management should ensure that mentorship programmes have clearly set policies to effectively guide them for effectiveness: Induction should be institutionalized at the University as new employees view it as an opportunity to fit into the system easily, and understand their duties and responsibilities at work; and finally, Universities should have a well thought out coaching programme that will add value to its employee's job satisfaction.

Key Words: On-the job training, Job-rotation, Mentorship, Induction, Coaching, Employee job satisfaction.

Linking Strategic Planning to Firm Performance of Food Processing Firms in Kenya: The Role of Entrepreneurial Orientation

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Abstract

The purpose of this study was to establish the linkage of strategic planning to firm performance of Food Processing Firms in Kenya. Strategic planning has gained a lot of interest worldwide as it is seen as an avenue to help bridge the information gap between food processing firms and the world. Further, although strategic planning is important to food processing firms, entrepreneurial orientation (EO) is key as it determines the success or failure of SMEs. There is little research that has been done to determine if EO moderates the relationship between strategic planning and performance of food processing firms in Kenya. The study used a cross-sectional survey research design. The study population was 71 owner-managers of food processing firms that used best manufacturing practices and are registered with Kenya Association of Manufacturers (KAM). The main data collection instrument was a self-administered semi structured questionnaire. Structural Equation modeling (SEM) was used to analyse the measurement model and test the hypothesized relationship in this study. The hypotheses in this study were tested using and hierarchical moderated multiple regression (MMR). The study found out that EO moderates ($R^2 = 2.4\%$) the relationship between strategic planning and performance of food processing firms in Kenya. The moderating effect of EO gained 2.4% variance in the firm performance above and beyond the variance by strategic planning and firm performance. These findings show that, food processing firms in Kenya would gain infusing EO into their proactivity strategies. Strategic planning in a firm is of importance since it enables the firm to work effectively and efficiently, EO determines how the firm utilizes those plans. Food processing firms in Kenya should develop strategic plans at different stages of their life cycle, especially in preparation to launch new products.

Keywords: Entrepreneurial Orientation; Firm Performance; Strategic Planning.

Division or Dialogue: Government Perspective on the Management of Cattle Rustling Among Pastoral Communities in Kenya

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Abstracts

Cattle rustling in Kenya is a vice that affects economic growth negatively to the affected communities. It is obvious that where such a vice takes place, there is under development, poor families and low school uptake. This affects even national growth rate given that such communities never or scantily contribute to the country's growth rate despite the fact that the government of Kenya allocates budget to these regions like all other areas. This paper will focus on how the Kenyan government utilizes state-based policies in the management of cattle rustling among pastoral communities and the extent to which the policy leads to division or dialogue. The general objective is an evaluation of government policies in management of cattle rustling among pastoral communities in Kenya. The specific objective is to examine the efficacy of the government policies in the management of cattle rustling and evaluate whether the policy brings dialogue or division amongst the warring communities. The study will cover the five counties in the North western part of Kenya namely, Elgeyo-Marakwet, Baringo, West Pokot, Samburu and Turkana. The sample size of the population is 384, which is determined by the deployment of Krejcie, R.V., & Morgan, D.W. table. The paper will utilize both primary and secondary data sources to access data. In this case, the mixed study design, which involves qualitative and quantitative paper techniques, will be applied to bring out the intended paper results.

Key Words: dialogue, government perspective, cattle rustling, pastoral communities.

Relationship between Organizational Culture and Service Quality in Universities in Kenya

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Abstract

This article sought to investigate the relationship between Organizational Culture and Service Quality in universities in Kenya. Dimensions of Organizational Culture that were addressed were Consistency, Involvement, Mission and Adaptability which were measured using Denison's Organizational Culture Survey (DOCS). Service Quality dimensions measured were Reliability, Assurance, Tangibles, Empathy and Responsiveness using SERVQUAL. This study used survey research design which was quantitative in nature. Sample size consisted of 225 teaching staff in the business program in four chartered universities in Kenya. Data was analyzed using descriptive statistics. The data was collected from 189 respondents which translated to 84% response rate. To measure the causal relationship, correlation analyses and multiple regression were used. The study findings showed that there was a significant, positive relationship ($r=0.727$, $0.000 < p\text{-value of } 0.05$) between Organizational Culture and Service Quality in universities in Kenya. Further findings showed that Involvement dimension had the highest correlation value ($r=0.654$), followed by Consistency dimension ($r=0.649$), Mission dimension ($r=0.605$) and lastly Adaptability dimension ($r=0.599$). The study findings showed that Organizational Culture had a significant influence ($r^2=0.529$, $0.000 < p\text{-value of } 0.05$) on Service Quality in universities in Kenya. Further findings showed that the four dimensions of Organizational Culture had a significant influence ($r^2=0.731$, $0.000 < p\text{-value of } 0.05$) on Service Quality in universities in Kenya. The study concluded that there was a relationship between Organizational Culture and Service Quality in universities in Kenya. The study further concluded that Organizational Culture was a significant predictor of Service Quality in universities in Kenya. This study recommends the strengthening of organizational culture in universities to improve effectiveness that will lead to better service quality in universities.

Keywords: Organizational Culture, Service Quality, Universities

The Influence of Firm's Culture on Organizational Performance among Insurance Companies in Kenya

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Abstract

Kenyan insurance companies constantly face many challenges arising from their operational environment. These many challenges relate to mispricing of insurance policies, lack of the required human resource capacities, and changes in interest rates among others. Often these factors lead to reduced performance and in adverse cases collapse of these firms. This problem has been compounded by the outbreak of Covid-19 which has adversely affected the business spectrum world over. Remarkably, businesses that have remained resilient have exhibited a culture of adaptability, mission involvement and consistency. This study sought to determine the influence of firm's culture on performance of insurance companies in Kenya. The study was anchored on institutional theory. The research philosophy adopted was positivism. Descriptive and correlational research designs were adopted with the study population comprising 453 management staff in the 55 registered insurance companies in Kenya. A sample size of 208 participants was selected using stratified sampling technique. Primary data was collected via semi-structured questionnaires while secondary data on organization performance was collected using a data collection sheet. Data analysis was conducted using descriptive statistics and inferential analysis. Results showed that a significant positive correlation exists between organization performance and firm's culture ($r=0.840$; $P=0.000$) and that firm's culture significantly influenced performance. The conclusion made was that the firm's culture was significant in influencing organizational performance. The study recommends that management of insurance companies should cultivate, and uphold the firm's culture. The results of the study will be beneficial to the managers of insurance firms, their employees and the government as it shows the significance of the firm's culture in stimulating performance of insurance companies in Kenya.

Keywords: Adaptability; Consistency; Firm's culture; Mission involvement; Organization; Organizational performance.

Training in agriculture and natural resource management in institutions of higher learning in Kenya: The need for review of curricula

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Abstract

Education and training is a principal catalyst in the realization of Vision 2030 through leadership in the development of skills and knowledge. Despite the fact that education and training in agriculture, water, environment, and other aspects of natural resource management is one of the key drivers of socio-economic growth, it faces challenges including mismatch of skills generated and job

market needs, attributable to outdated curricula, limited practical skills and weak interaction between academia and industry. A review was carried out on 290 undergraduate programmes consisting of 161 in agriculture, 73 in environment and 56 in water; and 229 diploma programmes comprising 98, 76 and 65 programmes in the same areas, respectively. A total of 1393, 712 and 679 experts in agriculture, environment and water respectively were interviewed. The findings show that only 15.2% of undergraduate programmes were reviewed every cycle. Half of the programmes in both levels had not been reviewed for 10 years. The gaps in undergraduate and diploma programmes include limited or no course units on communication and technology; data and information systems; climate science, social values and integrity; and entrepreneurial and business skills. Therefore, there is a need to strengthen frameworks for regular curricula reviews every cycle, foster multi-stakeholder partnerships, retool experts and innovative pedagogical approaches to enhance relevance to industry.

Keywords: Academia; Education; Industry Post-secondary training; Skills

E-Supplier Payment and Organizational Performance

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Murang'a University of Technology

Abstract

The incessant growth of technology has brought about significant changes in the payments systems and currency flows in the world. Firms have adopted the use of electronic methods of payments such as Mobile banking services, smart cards wallets, debit cards or credit cards, EFT and also crypto currencies. Some of these payment methods use Blockchain technology to facilitate efficient, permanent and transparent transactions. African Countries like Ethiopia, South Africa have seen the benefits of using blockchain technologies. By adopting such technologies, it reduces chances of fraud and provides real-time monitoring of transactions. Kenya has become the one leading country in using mobile banking especially during the COVID-19 pandemic. These payment methods have been used in cyber security, supply chain, banking, charity, healthcare and many others. The main objective of the study is to identify the possibility of using these payment methods as a way of managing suppliers in organizations to bring about organizational performance. The study aimed to determine whether parastatals use blockchain technology in authenticating, mobile payments/banking, electronic cheque transmission, electronic invoices and receipts carrying out payment transactions and automatic self-billing for organizational performance. Purposive sampling was used to acquire a sample size of 91 respondents. Questionnaires were used as the principal research instrument. The study confirmed there was a statistical significance between e-supplier payments and organization performance. The study recommends that parastatals embrace new technology such as the use of blockchain technology and also improve systems compatibility with suppliers.

Keywords: Block chain, Electronic Funds Transfer, Mobile banking, Suppliers Management

Assessing The Drivers of Enhanced Auditors' Performance: A Case Study In Public Universities In Kenya

Ruth Mwendu and Dennis Otieno
Murang'a University

Abstract

The study evaluated the key drivers of enhanced auditor's performance in public universities in Kenya. The study posited that work environment, auditor's competence, independence and authority have not significant effects on their audit performance in public universities in Kenya. The target population was the 31 chartered universities in Kenya. It used a descriptive case study to analyze the impact of the three variables on performance using likert collected responses. Data was collected using a structured questionnaire for respondents from each university. The questionnaire was designed by the researcher based on the research questions and was pre-tested to ascertain the suitability of the tool before actual administration. The study used both quantitative and qualitative methods of data analysis. The results established that internal auditors' working environment complying with professional standards is the most important contributor to internal auditing and formal auditing standards and its independence and authority positively influenced their auditing performance. Performing auditing work according to internal auditing standards contributes significantly to the quality and effectiveness of auditing and finally that internal auditors evaluate and contribute to the improvement of risk management, control and governance using a systematic and disciplined approach in the public sector. To enhance auditor's performance and mitigate adverse corporate governance issues requires that the universities offer auditors independence and authority in the management protocols and establish an internal audit unit to undertake periodic audits. To facilitate faster delivery

of audit services including the detection and prevention of frauds and/or non-compliance with public expenditure management, the public universities should provide a conducive work environment that enables the use of cutting edge ICT technology to support auditing functions, promote continuous training and develop institutional mechanisms (e.g., enforcement, auditing, or corporate governance structures) to encourage compliance with international standards.

KEY WORDS; auditor, independence, compliance, environment, objectivity

Effect of Receivables Management Practice on Performance of Commercial Banks in Kenya

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Abstract

The purpose of the study was to analyze the determinants of cash flow management practice on performance of commercial banks in Kenya. Specific objectives of the study were to determine the effect of cash forecasting practice on performance of commercial banks in Kenya, to identify the effect of cash accounting practice on performance of commercial banks in Kenya, to evaluate the effect of receivables management practice on performance of commercial banks in Kenya, to assess the effect of payables management practice on performance of commercial banks in Kenya and to examine the effect of liquidity management practice on performance of commercial banks in Kenya. The study was based on Portfolio theory of Cash Management, Cash Management theory, Transaction Cost theory, Free Cash Flow theory and pecking order theory. The study used mixed research design which involves collecting and analyzing both qualitative and quantitative data. The target population of the study comprised the 6913 employees in management and supervisory cadres of commercial banks in Kenya. Stratified sampling technique was used to identify the sample size in every stratum. Data collection instruments were both structured and unstructured questionnaires. Data collection methods were both primary and secondary. The data was analyzed using Statistical Program for Social Sciences (SPSS) windows version 21. Multiple linear regression analysis was carried out to analyze the determinants of cash flow management practice on performance of commercial banks in Kenya. Pilot test was carried out for validity and reliability of research instruments. Regression analysis was carried out to test the significant levels of one variable to the other in the study. ANOVA was carried out to test the hypotheses of the study. The study is significant to the banking sector and the government of Kenya in formulation of different financial decisions and in policy making. The results of the study indicate that all the independent variables have a significant positive effect on performance of Commercial banks Kenya. The most influential variable is liquidity management practice with a regression coefficient of 2.24, followed by payables management practice with a coefficient of 2.174, then cash forecasting practice with a coefficient of 0.726. Receivables management practice had a coefficient of 0.483 and lastly cash accounting practice with a coefficient of 0.421. The findings revealed that commercial banks in Kenya carry out cash flow forecasting practice and that inflation rates influence interest rates of commercial banks in Kenya. Cash accounting practice was found to be positively related to performance in commercial banks in Kenya. Receivables management practice was found to be positively related to performance of commercial banks in Kenya. Payables management practice was found to be positively related to performance of Commercial banks in Kenya. Liquidity management practice was found to be positively related to performance of Commercial banks in Kenya. The study recommends that the management of commercial banks in Kenya should be enhanced through frequent audits to be able to curb interest rates especially the unanticipated inflation which adversely affects the functions of money by undermining wealth holders' confidence in its ability to be used as medium of exchange and store of value.

Keywords: Receivables Management, Performance

The Contribution of Work Life Balance Benefits on Employee Performance in the State Corporations: The Kenyan Context

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Abstract

Employee Performance has been of great interest to organizations in the existing turbulent environment and thus the workforce is regarded as the engine of any organization and no organization can attain its goals without an effective workforce. The success of a firm hence is dependent on the individual productivity and performance of each employee which can be necessitated through effective reward management strategies such as offering work life balance benefits. The main objective of the study was to determine the influence of work life balance benefits on Employee Performance in the State Corporations in Kenya. Work Life Balance was

operationalized as vacation time, flexible working schedules and specific needs services. The major theories that underpin the study included Herzberg's Two-Factor Theory and Adams Equity Theory. The study used descriptive and explanatory research design with a sample size of 642 employees derived from different cadres in the state corporations in Kenya. The Cronbach's alpha coefficient and factor analysis were used to check the reliability of the questionnaire. Data was analyzed by use of SPSS and presented through percentages, means, standard deviations and frequencies for descriptive analysis and further used regression analysis to test the significance of the variable at 5% significance level when testing the hypothesis. The findings showed that work life balance rewards moderately influence employee performance ($R=.337$ and $R^2=.113$). The study concluded that most state corporations in Kenya recognized work life balance programs, however, these organizations hardly budgeted for the work life programs. The study therefore recommends that work life programs should be considered and budgeted for. Offering gym facilities to employees provides a healthy lifestyle and also counters stress. Organizations can also offer child care facilities so that the parents can work comfortably without worrying about their children and hence maximum concentration at the workplace that would lead to better productivity. Moreover, companies should formulate and implement reward practices and policies that are not only fair but also consistent with their long and short-term goals. Hence, effective work life balance benefits should be aligned with the strategy of an organization to attract, motivate employees' performance, and retain staff with the skills, knowledge and abilities needed to achieve the strategic objectives of the organization.

Keywords: Policies; Productivity; Retention; Reward management; Strategic Objectives

Enhancing the Contribution of Higher Education in Fourth Industrial Revolution

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Abstract

Global society is changing because of the shifts in technological capacity; higher education must change with it. This paper explores the contribution of higher education in fourth industrial revolution; the societal changes from the fourth industrial revolution will require higher education to develop greater capacity for ethical and intercultural understanding, placing a premium on liberal arts-type education with modifications to adapt to the particular issues raised by fourth industrial revolution technologies and their disruptions to society. Rapid adjustment of higher education institutions is needed by expanding its capacity to accommodate the acquisition of new knowledge by researchers. Social and educational transformations from the first three industrial revolutions can provide a starting point in our considering the potential transformations in higher education arising from the Fourth Industrial Revolution (4IR). The literature and analysis presented show a new approach of enhancing the contribution of higher education in fourth industrial revolution and help the universities in considering some changes in its restructuring in delivering four industrial revolution agenda. Literature analysis shows that higher education's institutions have a complex, dialectical and exciting opportunity which can potentially transform society for the better. The fourth industrial revolution is powered by artificial intelligence and it will transform the workplace from tasks-based characteristics to human centered characteristics. Therefore, improving the quality of service in higher education can bring about a significant change in society. The study used the data for the 35 respondents of higher education institutions. The study collected secondary data and a diagnostic test was done on study variables which included the test of normality and reliability test. The test of normality showed that data was a little skewed and kurtotic and did not differ significantly from normality. Based on the results obtained from the analysis of the study, the study recommends that more studies be done on the topic so as to establish unknown factors that enhance higher education in the fourth industrial revolution. Out of all the independent variables the study found out they have a positive correlation with the dependent variable. The study recommends adoption and implementation of higher education in the fourth industrial revolution as a continuous process of creating, acquiring and transferring knowledge as one or two practices may not yield the desired results. The study also recommends that higher education should embrace the fourth industrial revolution so as to enhance efficiency of economic growth.

Key Words: industrial, revolution, institutions, fourth



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