



Kirinyaga University

4th Annual International Conference, 2021

BOOK OF ABSTRACTS

THEME

**ACHIEVING SUSTAINABLE DEVELOPMENT THROUGH INNOVATIVE RESEARCH
AND GLOBAL COLLABORATIONS**

CONFERENCE DATES

MARCH 24 - 25, 2021

VENUE

VIRTUAL PLATFORM, KIRINYAGA UNIVERSITY, KENYA



KIRINYAGA UNIVERSITY

4TH ANNUAL INTERNATIONAL CONFERENCE, 2021

Book of Abstracts

Editors

Prof. Charles, O. A. Omwandho, Ph.D

Dr. Jotham M. Wasike, Ph.D

Dr. Agnes Mutiso, Ph.D



KIRINYAGA UNIVERSITY

4TH ANNUAL INTERNATIONAL CONFERENCE, 2021

BOOK OF ABSTRACTS & PROGRAMME

THEME

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RESEARCH AND GLOBAL COLLABORATIONS**

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VIRTUAL PLATFORM OF KIRINYAGA UNIVERSITY



KIRINYAGA UNIVERSITY

4TH ANNUAL INTERNATIONAL CONFERENCE

MARCH 24-25, 2021

THEME

**ACHIEVING SUSTAINABLE DEVELOPMENT THROUGH INNOVATIVE
RESEARCH AND GLOBAL COLLABORATIONS**

SUB THEMES

- WELLNESS, EPIDEMIOLOGY, VACCINOLOGY, IMPACT & GLOBAL RESPONSES TO CORONA VIRUS PANDEMIC, INFECTIOUS AND RESPIRATORY DISEASES
- REVOLUTIONIZED INNOVATIVE ENGINEERING AND TECHNOLOGY FOR SUSTAINABLE DEVELOPMENT
- ICT, SCIENCE AND TECHNOLOGY FOR POVERTY ALLEVIATION
- AGRICULTURE, ENVIRONMENT AND WATER FOR SOCIETAL EMPOWERMENT.
- ENTREPRENEURSHIP AND STRATEGIC BUSINESS MANAGEMENT FOR SUSTAINABLE DEVELOPMENT.
- EDUCATION FOR POVERTY ALLEVIATION

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DAY ONE: WEDNESDAY, MARCH 24, 2021**Preliminaries**

- Conference Registration
- Familiarization with conference programme
- Corrections on the program
- Make any announcements and changes

8:00am - 5.00pm: Conference Opening /Parallel Sessions/Plenary

Coordinator: Dr. Jotham M. Wasike

VENUE: VIRTUAL

8:30am - 8: 40 am	Welcoming Remarks Deputy Vice Chancellor (ASA). Prof. Charles O. Omwandho, PhD
8: 40am - 9:00am	Opening Remarks Vice Chancellor, Prof. Mary Ndungu, PhD.
9.00 am- 1.00pm	Parallel Sessions & Plenary
1.00pm - 2.00pm	Lunch/Health Break
2.00pm - 5.00pm	Parallel Sessions & Plenary
5.00pm	Announcements/ Closing

MORNING PARALLEL SESSIONS

9.00AM – 1.00PM

THEME	HEALTH (A)
Chair	Dr. David Nderu
Rapporteur	Mr. Kenny Kamau

1. Webale, M, K^{1*}, Guyah, B², Wanjala, C³, Munyekenye, G¹, Marwa, I, N¹, Ochieng, E¹, Shaviya, N³, Nyanga, P, L⁴, Sella, K. Webale, S, K², Kitungulu, N⁶, Kiboi, N⁷. (¹KyU, ²Maseno University, ^{3,5}MMUST, ⁴MOH, ⁶KU). **Seasonality of Enteric Bacterial Pathogens and Antimicrobial Resistance Profiles among Diarrheic Children in Nairobi City, Kenya.**
2. Nderu, D. (Kirinyaga University). **COVID-19 Pandemic Silver Lining in the Context of Infectious Disease Control in Africa.**
3. ¹Mutinda, L^{1,2}Maina,E².(¹Embu County Government,²Kirinyaga University). **Prevalence of Metabolic Syndrome among Inmates on Haart at Embu Prison Dispensary, Comprehensive Care Clinic.**
4. Waithaka, P, N¹, Gathuru, E .M², Githaiga, B, M³, Ouma, C. O⁴. (¹KyU, ^{2,3}, ⁴Egerton University).**Microbial Degradation of Plant Waste Materials using Actinomycetes Isolated from Egerton University Soils in Kenya.**

THEME	HEALTH (B)
Chair	Mr. Dennis Butto
Rapporteur	Ms. Angela Alwora

1. Murigi, M, Mogale, R, S, Moagi, M: (University of Pretoria). **A Sustainable Model for the Provision of Youth Friendly Sexual and Reproductive Health Services in Kenya: An Intergrative Review of Literature.**
2. ¹Kahiga, N, ²Mberia, H, ³Ngula, K. (JKUAT^{1,2}, Chuka University³). **Influence of Consequences Frame on the Perception of Obesity among Middle-aged Women in Nairobi County, Kenya.**
3. Murigi, M¹, Mogale, R, S², Moagi, M³. (¹KyU,^{2,3}University of Pretoria). **Youth's Perspectives on a Sustainable Model for the Provision of Youth Friendly Sexual and Reproductive Health Services in Kenya: A Quantitative Approach.**
4. Mwaura, A, N¹, Scheiner-Bobis, G², Maoga, J³, Mecha, E⁴, Omwandho, C O. A⁵, Riaz, M. A⁶, Konrad, L⁷. (^{1,2,6,7}Justus-Liebig University, ^{3,4,5}UoN, ⁵KyU). **Soluble Betaglycanand Tgf-B Signaling in Human Endometrial and Endometriotic Cells.**

THEME	ENGINEERING
Chair	Eng. Hannah Kinuthia
Rapporteur	Ms Daisy Chepkorir

- 1) Kiwiri, F. (Kirinyaga University). Real Time Monitoring and Control of Scale Formation in the Geothermal Energy Generation Systems.
- 2) Mbaabu, L¹, Itote, F². (Kirinyaga University, South Eastern Kenya University) Power Quality Model of Distributed Networks Integrated with Renewable Energy Sources.
- 3) Thimo, L, Mbaabu, L, Mwai, M. (Kirinyaga University). Could Renewable Energy Support Service Delivery during COVID-19 Pandemic in Kenya?

THEME	ICT
Chair	Dr. Peter Wanjohi
Rapporteur	Mr. Martin Kithinji

- 1) Reuben, J.M¹, Obura, J². (¹Kirinyaga University, ²Bomet University College). Detection and Prevention of Cyber Threats using Open-Source Applications for Startup-Fintech Firms in Kenya.
- 2) Mburu, S. (Kirinyaga University). Digital Learning in the Context of Covid-19 Crisis: Leveraging on “Big Data” Analytics.
- 3) Kangogo, W. (Jaramogi Oginga Odinga University of Science and Technology). Spectral Boundedness of Compact Elementary Operators.
- 4) Nambiro, A¹, Wabwoba, F², Wasike, J³. (D^{1,2}Kibabii University, Kirinyaga University). Secure Savings and Credit Cooperatives’ Mobile Banking Service Provision through Cyber-Security Impact Mitigation.

THEME	AGRICULTURE & ENVIRONMENT
Chair	Dr. Paul Waithaka
Rapporteur	Ms. Lucy Kamau

- 1) Kanda, E. K, Awandu, E, Kimokoti,S,N & Achoka, J. (Masinde Muliro University of Science and Technology).Water - Energy - Food Nexus in Kenya: Climate Change Impacts and Adaptation Strategies.
- 2) Rutto, D,K, L & Omami, E. N.(University of Eldoret). Evaluation of Seed Quality of Jute Mallow (*Corchorus Olitorius*).
- 3) Mbiyu, M^{1,4}, Maina, W², Kimenju, J³, Nyongesa, M⁴, ³Haukalend, S⁵(^{1,2,3}University of Nairobi, ⁴KALRO, ⁵ICIPE). Reduced Egg Hatch and Increased Mortality of Potato Cyst Nematode (*Globodera Rostochiensis*) Juveniles after Treatment with Different Plant Extracts under *in Vitro* Conditions.

THEME	ENTREPRENEURSHIP AND STRATEGIC BUSINESS (A)
Chair	Dr. Hannah Wambugu
Rapporteur	Mr. Patrick Mwangi

- 1) Muigai, R. G¹ & Nasieku, T². (¹Kirinyaga University, ²Jomo Kenyatta University of Agriculture and Technology). Working Capital Management and Financial Distress of Non-Financial Companies Listed in Nairobi Securities Exchange.
- 2) Muchangi, D, Njoroge, D, Weru, J. (Kirinyaga University). Management Support and Strategies Integration in County Governments in Kenya: A Case of County Government of Kirinyaga.
- 3) Muriithi, K, &Waweru, G. (Kirinyaga University). Diaspora Remittance and Economic Growth and Development Nexus in Kenya.
- 4) Nyaga, N, G¹, Jagongo, A, O2., Omagwa, J³. (¹Mount Kenya University, ^{2&3}Kenyatta University). Moderating Effect of Inflation on the Relationship between Collateral and Credit Rationing among Registered Small and Medium Enterprises in Kiambu County, Kenya.

THEME	ENTREPRENEURSHIP AND STRATEGIC BUSINESS (B)
Chair	Dr. Dennis Muchangi
Rapporteur	Ms. Joy Sarah

- 1) Mbusi, E.M¹, Peter, T.K², Muturi, W.M³. (¹Kirinyaga University, ^{2,3}Jomo Kenyatta University of Agriculture and Technology).The Impact of Macro-Economic Factors on Construction Output in Kenya.
- 2) Biwott, G. K, & Barno, L.J. (Bomet University College). Green Entrepreneurship as a Panacea for Financial Sustainability of Businesses in Kenya during the Covid 19 Era.
- 3) Kioko, T.M. (University of Nairobi). Impact of Public Debts on Private Investment in Kenya.

THEME	EDUCATION FOR POVERTY ALLEVIATION
Chair	Dr. Anne Muiru
Rapporteur	Mr. Martin Muchiri

- 1) Ibrahim, D. S. (Sule Lamido University, Nigeria). **Factors that Influence the Uptake of Research Evidence into Education Policy and Practice in North-Western Nigeria.**
- 2) Ngugi, M¹, Mberia, H², Ngula, K³. (^{1,2}Jomo Kenyatta University of Agriculture and Technology, ³Chuka University). **Internal Communication and Employee Engagement in Technical Training Institutions in Kenya.**
- 3) Mutende,R.(Kibabii University).**Preservice Science Teachers' Adoption Aimplimentation of the Interactive Lecture Teaching Method.**
- 4) Abdullahi, M. I. (Sule Lamido University, Kafin Hausa, Nigeria). **Morphological Analysis of Hybrid Compound in Hausa Language.**

AFTERNOON PARALLEL SESSIONS

2.00PM - 5.00PM

THEME	HEALTH (A)
Chair	Prof. Laura Wangai
Rapporteur	Mr. Kenny Kamau

- 1) Kagoiyo, N.S¹, Kagoiyo, S.W², Lukorito, L.K³, Obunde, M.A⁴. (1Kirinyaga University, 2Kirinyaga County Referral Hospital, 34Uzima University College). Knowledge, Attitude and Practice on Soil Transmitted Helminthiasis among Pupils in Ziwani Learning Centre, East Kisumu Location, Kisumu County, Kenya.
- 2) Waithaka, P. N¹, Gathuru, E.M², Muriuki, B, G³, Kamunyi, J. N⁴. (1KyU, 2,3,4Egerton University). Control of Bacterial Pathogens Isolated from Water Using Actinomycetes Extracts at Egerton University, Kenya.
- 3) Kagoiyo, N.S¹, Danga, A.A², Lukorito, L.K³, Kagoiyo, S.W⁴. (1KyU, 2,3Uzima University College, 4Kirinyaga County Referral Hospital). Factors Affecting Adherence to Antiretroviral Drugs among Adolescents [10-18] at Ahero County Hospital, Kisumu County, Kenya.

THEME	HEALTH (B)
Chair	Dr. Godwill Munyekenye
Rapporteur	Ms. Angela Alwora

- 1) Wanyonyi, F. S¹, Pembere, A², Mutua, G, K², Orata, F³, Louis, H⁴. (1,2Sangalo Institute of Science and Technology, 3JOUST, 4University of Calabar). Computational Screening of Zeolites for the Adsorption of Selected Pharmaceutical Pollutants.
- 2) Wagutu, W. A. (Kirinyaga University). Crustacean Versus Mammalian Derived Calcium Phosphates for Water Treatment.
- 3) Mwita, M. G, Lewa, R.C, Mongosi, D. (Eldoret National Polytechnic). Establishment of Global Responses to Corona Virus Pandemic.

THEME	ENGINEERING
Chair	Eng. Emmanuel Mbusi
Rapporteur	Ms. Daisy Chepkorir

- 1) Mwai, M. M¹, Gichane, M.M², Thimo, L³.(^{1,3}Kirinyaga University, ²Dedan Kimathi University).Design and Fabrication of a Solar Powered Touchless Temperature Monitoring and Hand Sanitizing Device.
- 2) Muchiri, N. (Kirinyaga University). Real-time Navigation for Quad-Copter Engaging a Target.
- 3) Wainaina, P.M¹, Okoth, M. W², Owino, G³.(¹Kirinyaga University, ²University of Nairobi, ³Egerton University). Variations of Vapour Compression Refrigeration Systems Cooling Loads with Varying Solar Insolation.

THEME	ICT
Chair	Dr. Geoffrey Muthooka
Rapporteur	Ms Catherine Mukunga

- 1) Otwande, A. (Kirinyaga University). Determination of Moments of Binomial mixtures using Recursive Relations.
- 2) Rotich, E, K, Ikoha, A, Wasike, J. (²University of Eldoret, ²Kibabii University, ³Kirinyaga University). Biometric Properties and Network Technologies as Determinants for a Secure Electronic Voting Architecture.
- 3) Kerre, D. (Strathmore University). A Deep Normalized Neural Network Model for Strawberry Fungal Leaf Disease Detection.

THEME	AGRICULTURE & ENVIRONMENT
Chair	Dr. Dickson Kinyua
Rapporteur	Ms Lucy Kamau

- 1) Gichuru, V. (Pwani University). Kenya's Green Revolution to Enhance Food Security.
- 2) Mburia, L.N. (Isiolo County Public Service Board). Use of Eco-Concrete Blocks in the Building Industry for Environmental Sustainability.

THEME	ENTREPRENEURSHIP AND STRATEGIC BUSINESS (A)
Chair	Dr. Prof Pius Odunga
Rapporteur	Mr. Patrick Mwangi

- 1) Mutongu, Z. B. (St. Paul's University-Limuru). **Entrepreneurship and Sustainable Economic Development.**
- 2) Mwangi, G. M¹, Muigai, R.G², Kungu, J³.(¹Kirinyaga University, ²Laikipia University). **Effects of Corporate Income Tax Incentives on Financial Performance of Manufacturing Firms in Kenya.**
- 3) Ekambi, J.S. (Daystar University). **Sustaining Global Economies in the Midst of Calamities: A Case of Retirement and Retired Security in Kenya.**
- 4) Odongo, M. (Zetech University). **Effect of Natural Disasters on the Productivity of Micro, Small and Medium Enterprises in Kenya: A Case of Flood Events in Nyanza Region**

THEME	ENTREPRENEURSHIP AND STRATEGIC BUSINESS(B)
Chair	Dr Agnes Mutiso
Rapporteur	Ms Joy Sarah

- 1) Muchira, B, W, Jagongo, A & Simiyu, E. (Kenyatta University). **Venture Capital Risk Measures and Access to Venture Capital Financing by SMEs in Nairobi County, Kenya.**
- 2) Maende, B., Guyo, W, Odhiambo, R. (Jomo Kenyatta University of Agriculture and Technology). **Influence of Knowledge Mapping on Employee Performance in Public Universities in Kenya.**
- 3) Ngutiku, P.K, Karanja, N.P, Romanus, O. (Jomo Kenyatta University of Agriculture and Technology). **Effect of Entrepreneurial Business Finance on Growth of Micro and Small Enterprises in Kenya.**

THEME	EDUCATION FOR POVERTY ALLEVIATION
Chair	Dr. Bernard Chemwei
Rapporteur	Mr. Martin Muchiri

- 1) Chepsiror, E. (Catholic University of Eastern Africa). Effects of Lecture Teaching Strategy on Performance in English Subject in Secondary Schools in Uasin- Gishu County, Kenya.
- 2) Koros, H.K. (Kenya Technical Trainers College). E-Learning Effective in Poverty Alleviation through Technical and Vocational Education and Training.
- 3) Shu'aibu, S.M. (Sule Lamido University, Kafin Hausa, Nigeria). The Effect of Testing Conditions on the Students' Test Performance of Disatance Learning System (DLS) in Jigawa State, Nigeria.

DAY TWO: THURSDAY, MARCH 25, 2021

- Preliminaries
- Registration
- Announcements

Coordinator: Dr. Agnes N. Mutiso

VENUE: VIRTUAL

8.30am - 10.30 am	Morning Parallel Sessions
10.30pm - 11.00am	Health Break
11.00am- 1.00pm	Mid-Morning Parallel Sessions
1.00pm- 2pm	Health/Lunch Break
2.00pm - 4.30pm	Afternoon Parallel Sessions
4.30pm-4.35pm	Closing Remarks from DVC(ASA) Prof. Charles O. Omwandho, PhD.
4.35pm-4.40pm	Closing Remarks Vice Chancellor, Prof. Mary W. Ndungu, PhD
4.40pm-4.45pm	Announcements /Issuance of Certificates.
4.45pm-4.50pm	Vote of thanks by Representative of Participants
4.50- 5.00pm	Vote of thanks from KyU
5.00pm	End of Conference

MORNING PARALLEL SESSIONS

9.00 AM - 10.30AM

THEME	HEALTH (A)
Chair	Dr. Samuel Mburu
Rapporteur	Ms. Evah Maina

- 1) Githaiga, B .M¹, Lelmen, E², Mwangi, E M³, Waitthaka, P, W⁴.(^{1,2,3}Egerton University, ⁴KyU).Effects of *Withania Somnifera* Root Extracts on Serotonin Secretion in Suiz Albino Mice.
- 2) Njau, S.N. (Kirinyaga University). Nurses' Attitudes Towards Pressure Ulcer Prevention Guidelines at a Referral Hospital in Kenya.
- 3) Muriqi M.W¹, Mwangi, J.H² Diana, W³.(¹Kirinyaga University, ²Dedan Kimathi University of Technology). Challenges Facing Sustainable Clinical Mentorship among Nurse Mentors in the Clinical Areas.

THEME	HEALTH (B)
Chair	Dr Mark Webale
Rapporteur	Mr. Stanley Njau

- 1) Butto, D^{1,3}, Mberia, H², Bosire, J³. (¹JKUAT, ²KyU, ³TUK). **Health Provider-Patient Communication and People Living with HIV/AIDS: A Cross-Section Study from Homa Bay County, Kenya.**
- 2) Mecha, E^{1,2}, Mwaura, A¹, Maoga, J¹, Makunja, R², Charles O.A. Omwandho, C.O.A^{2,3}, Tinneberg, H¹, Konrad, L¹(¹Justus-Liebig University, ²University of Nairobi, ³Kirinyaga University). Zinc Ions in the Management of Endometriosis Pain.
- 3) Ouko, D.B. (Technical University of Kenya). Co-Administration of Chloroquine and Coenzyme Q10 Improved Treatment Outcome during Experimental Cerebral Malaria.

THEME	ENGINEERING
Chair	Eng Moses Mwai
Rapporteur	Eng.Nelson Muchiri

- 1) Bosire, R. Muvengei, O., Mutua, J., Kimotho. J. (Jomo Kenyatta University of Agriculture and Technology). Finite Element Analysis of Induced Residual Stresses (IRS) during Turning of Aisi 1020.
- 2) Ng'eno, V., Muli, C, Handa, C. (¹Kirinyaga University, ²Eurohub East Africa Limited, ³Technical University of Kenya). Mapping of Point and Non-Point Sources of Pollution within Nairobi River Basin and Mbagathi Sub-Basin.

THEME	ICT
Chair	Dr. Agatha Wagutu
Rapporteur	Ms Caroline Muthoni

- 1) Okelo, B. (Jaramogi Oginga Odinga University of Science and Technology). Properties of Operators in Norm-Attainable Algebras and their Applications.
- 2) Mukunga, C.W. (Kirinyaga University). Artificial Neural Networks and Fuzzy Logic for Software Maintenance Cost Estimation: A Comparative Review Study.
- 3) Wasiaya, O, C¹., Serede, S. G², Kinoti, H.M³. (^{1,3}Jomo Kenyatta University of Agriculture and Technology, ²United States International University). Social Utility of Mobile Phone Technology by Undergraduate University Students in Nairobi, Kenya.
- 4) Mude, L.H¹, Oduor, O. M², Onyango, O, M³. (^{1,2}University of Kabianga, ³Masinde Muliro University of Science and Technology). Automorphisms of Zero Divisor Graphs of Galois Rings.

THEME	ENTREPRENEURSHIP AND STRATEGIC BUSINESS (A)
Chair	Dr. David Njoroge
Rapporteur	Mr. John Douglas

- 1) Maina, E.W.¹, Muriithi, R. W.², Kinyua, P.G.³, (1Kirinyaga University, 2³Dedan Kimathi University of Technology). **Strategic Responses and Sustainable Competitive Advantage of Milk Processing Firms in Kenya.**
- 2) Maina, E.W.¹, Kinyua, P.G.², Muriithi, R. W. ³(1Kirinyaga University, 2³Dedan Kimathi University of Technology). **Business Innovations and Organizational Performance of Beverage Firms in Kenya.**
- 3) Otwoko, B. E, Maina, K, & Kwasira, J. (Jomo Kenyatta University of Agriculture and Technology). **Influence of Monetary Policy on Financial Performance of Deposit Taking Saccos in Kenya.**
- 4) Orangi, A.K. (Kirinyaga University). **Determinants of Family Life Cycle as Demographic Segmentation Practices on Consumer Choice of Ready to Wear Clothes in Kenya.**

THEME	ENTREPRENEURSHIP AND STRATEGIC BUSINESS (B)
Chair	Dr. Gitau Muigai
Rapporteur	Ms. Joy Sarah

- 1) Wambugu, H. W¹, Musyoka, R². (1Kirinyaga University, 2University of Nairobi). **Situational Factors, Individual Factors and Marketing Factors and Behavior of Bread Consumers in Kenya.**
- 2) Kimemia, M. (Kirinyaga University). **Textile Market Responses to Covid-19 in Nairobi County. Creating Resilience in Textile Value Chain.**
- 3) Mungai, D. K & Maina, M. (Kirinyaga University). **Risk Management Strategies and Sustainable Competitive Advantage of Commercial Banks in Kenya.**
- 4) Odunga, P. (Kirinyaga University). **Assessing the Effects of COVID-19 and Impacts of Tourism on Kenya's Economy.**

THEME	EDUCATION FOR POVERTY ALLEVIATION
Chair	Dr David Kabata
Rapporteur	Ms. Grace Chomba

- 1) Kathure, P¹, Mberia, H², Ngula, K³. (^{1,2}Jomo Kenyatta University of Agriculture and Technology, ³Chuka University). Teacher-Student Communication and Prevention of Teenage Pregnancies in Public Secondary Schools in Narok County, Kenya.
- 2) Kamau, S.J¹, Rambo, C.M², Mbugua, J³. (¹Kirinyaga University, ^{2,3}University of Nairobi). Primary Schools' Development in Somaliland: The Role of Community Education Committees.
- 3) Nason, V. (St. Paul's University). Empowering the Church for the Management of Natural Resource-Conflicts: Case of Africa Inland Church in Baringo County.
- 4) Muiru,A,W.(Kirinyaga University).An Evaluation of the Influence of Depression among First Year University Students in Kenya .

MID MORNING PARALLEL SESSIONS
10.30AM - 1.00PM

THEME	HEALTH (A)
Chair	Dr. Elly Munde
Rapporteur	Ms. Evah Maina

- 1) Maoga, J¹, Mecha, E^{1,3}, Muhammad A. Riaz, M.A¹, Mwaura, A¹, Makunja, R³, Omwandho, C.O.A ^{3,4}, Tinneberg, H¹ Scheiner-Bobis, G², Konrad, L¹(¹Justus-Liebig University, ²University of Nairobi, ³Kirinyaga University). Expression of Membrane-Type 2 and 3 Matrix Metalloproteinases in Endometriosis and Adenomyosis.
- 2) Chepukosi, K. W¹, ¹Nyariki, J.W, ⁴Jillani, N.E, ¹Okanya,P.W. ^{2,3} Isaac, A.O.(^{1,2,3}Technical University of Kenya, ⁴Institute of Primates Research) .Co-Enzyme Q10 Down-Regulated Khat-Induced Toxicity in a Mouse Model.
- 3) Kimani, K¹, Kimani, F², Mbugua, A³. (¹Kirinyaga University, ²Kenya Medical Research Institute, ³JKUAT). Evaluating a Novel High Throughput LAMP Assay against Nested PCR for Detection of *Plasmodium Falciparum* Infections.

THEME	HEALTH (B)
Chair	Dr Janerose Muriuki
Rapporteur	Mr Stanley Njau

- 1) Mbisi, A , Ngari, D.M. (Kirinyaga University, Chuka University). **Barriers to Diabetes Foot Care Practices among Diabetes Patients attending Diabetes Clinic in Embu County, Kenya.**
- 2) Waitthaka, P. W¹, Gathuru, E.W², Githaiga, B.M², Ochieng, E.O²(¹Kirinyaga University, ²Egerton University).**Microbial Degradation of Polythene Using Actinomycetes Isolated from Maize Rhizosphere, Forest and Waste Damping Sites within Egerton University, Kenya.**
- 3) Kagoiyo, N.S, ¹, Kagoiyo, S.W², Lukorito, L.K³, Shipaaka, P.A⁴(¹Kirinyaga University, ²Kirinyaga County Referral Hospital, ^{3,4}Uzima University College).**Contextual Factors Influencing Utilization of Antenatal Care Services upto 4 Visits among Pregnant Women at Enzaro Health Centre, Vihiga County, Kenya.**

THEME	ENGINEERING
Chair	Eng. Rodgers Bosire
Rapporteur	Ms Cynthia Ogali

- 1) Kimemia, N. D. (Murang`a University of Technology). **Investigating Effect of IR Emitting Element to Time Constant of Solar Cell Lifetime.**
- 2) Mutonga, M.W, Kipkorir, E.W. Ng'etich, W.K. (Kirinyaga University, ²Moi University, ³University of Eldoret). **Application of AquaCrop Model Yield Optimization for Prediction of Optimal Sowing Dates under Alternative Soil Moisture Regimes in Laikipia, Kenya.**
- 3) ^{1,2}Kinuthia, H., ¹Letema, S, ²Majale, C. (¹Kenyatta University, ²Kirinyaga University). **Assessing the Pattern of Land Development in the Along the (Greater) Eastern Bypass in Nairobi Metropolitan.**
- 4) Karimi,S.M. (Zetech University). **Numerical Investigation of Thermal Elastohydrodynamic Lubrication Using the Power Law Model.**

THEME	ICT
Chair	Dr. Andrea Otwande
Rapporteur	Ms. Caroline Muthoni

- 1) Achoka, J¹, Nelima, M². Nyakundi, A³. (1,2Masinde Muliro University of Science and Technology, 3Jomo Kenyatta University of Science and Technology). **Evaluation of Cost-Benefits of Oyster Mushroom Production using Innovative Water Hyacinth Substrate for Sustainable Development of SME, Kenya.**
- 2) Walumbe, D. W¹, Ogalo, J², Waskie, J³. (1Eldoret National Polytechnic, 2Kisii University 3Kirinyaga University). **Security Model for Detection of Insider Security Systems Threats.**
- 3) Kithinji, M. (Kirinyaga University). **On the Evaluation Financial Risk using Conditional Value at Risk (CVaR).**

THEME	ENTREPRENEURSHIP AND STRATEGIC BUSINESS (A)
Chair	Dr. Evelyne Maina
Rapporteur	Mr. John Douglas

- 1) Otieno, D, O. (Technical University of Mombasa). **Impact of Covid-19 Pandemic on Micro, Small, and Medium-Sized Enterprises Operating in Mombasa, Kenya.**
- 2) Nderitu, J. W, Waiganjo, E & Orwa, G.O. (Jomo Kenyatta University of Agriculture and Technology). **Effect of Organizational Culture on the Implementation of Corporate Strategy in Private Chartered Universities in Kenya.**
- 3) Nderitu, S, Kibor, E & Koros, W. (Kabarak University). **Relationship between Biblical Context and Akurinu Mission with Emphasis on Poverty Alleviation.**

THEME	ENTREPRENEURSHIP AND STRATEGIC BUSINESS (B)
Chair	Dr Grace Kiiru
Rappertour	Ms Violet Njeru

- 1) Mungai, D. K & Kung'u, J. (Kirinyaga University). Mortgage Financing Options and the Sustainable Growth of Real Estate in Nairobi Metropolis, Kenya.
- 2) Mutiso, A. (Kirinyaga University). Financial Sustainability of Sacco's in Kenya: Challenges and Opportunities.

THEME	EDUCATION FOR POVERTY ALLEVIATION
Chair	Dr. Mark Waita
Rapporteur	Ms Grace Chomba

- 1) Mugambi, N.D¹ , Munzi, M. A², Teresia, M.W³(^{1,2}Chuka University, ³University of New South Wales, Australia). 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.
- 2) Kamau, J.K¹., Maina, M². (¹Kenya Medical Training College, ²Kirinyaga University). The Influence of Information, Education and Communication on the Success of Human Rights Education School Programmes in Kenya.
- 3) Muiro, A.W. (Kirinyaga University). An Assessment of Personality Traits on the Prevalence of Suicide Ideation and Attempts in Public Secondary Schools in Murang'a County, Kenya.
- 4) Muriuki, J. N. (University of Nairobi). An Investigation into the Challenges that Schools will be Facing in Implementing the Ministry of Health Guidelines on Covid 19 in Nakuru North Sub -County Secondary Schools.
- 5) Rotich, E. (Rift Valley Institute of Science and Technology). Mushroom Enterprise for enhanced CBET Curriculum Implementation.

AFTERNOON PARALLEL SESSIONS

2.00PM - 5.00PM

THEME	HEALTH (A)
Chair	Dr. Elly Munde
Rapporteur	Mr. John Mwangi

- 1) Njagi, N.P. Ayuku, D, Kahiga, J. (Moi University). **The Participation of Adolescents in HIV-Related Research: Experiences of Researchers and Regulators in Western Kenya.**
- 2) Ndung'u, R.W. (Kirinyaga University). **Investigation and Prosecution of Sexual Offences in Relation to Forensic Medical Evidence in Kiambu County, Kenya.**
- 3) Mwangi, P.G, Mugambi, M & Muchiri, J. (Kenya Methodist University). **Effects of Exotic Tree's Litter Quality on Responses of the Adjacent Native Grasses**

THEME	HEALTH (B)
Chair	Ms Mary Murigi
Rapporteur	Mr Stanley Njau

- 1) Njagi, N.P. Ayuku, D, Kahiga, J. (Moi University). **Challenges that Affect Fair Inclusion of Adolescents in HIV-Related Research: A Case of Western Kenya.**
- 2) Waithaka, P. N¹, Mwaura, F.B¹, Wagacha, J.M¹, Gathuru, E.M², Muriuki, B.W². (1Kirinyaga University, 2Egerton University). **Molecular Characterization of Four Antibiotic Producing Actinomycetes Isolated from Menengai Crater.**

THEME	ENGINEERING
Chair	Eng. Patrick Wainaina
Rapporteur	Eng. Nelson Muchiri

- 1) Sitienei, V., Masaga, S. (Rift Valley Institute of Science and Technology). **Solar Powered Automated Fencing System.**
- 2) Okaka, F. O & Temo, P. (Rift Valley Institute of Science & Technology). **The Modern Traveler's Kit.**

- 3) Kimemia, N. D. (Murang'a University of Technology). Effect of Varying Thickness on Performance of Titanium Dioxide Solar Cell.
- 4) Marangu, P.K, Rukaria, S, Catherine Kinoti, C. (Meru National Polytechnic). Optimizing a Trapezoidal Open Channel Fluid Flow for Steady Uniform Flow.

THEME	ICT
Chair	Dr. Reuben Mwikya
Rapporteur	Ms Irene Mwangi

- 1) Mwangi, I, W, Wasike, J. (Kirinyaga University). A Framework for Curriculum Design and Development using Blockchain Technology.
- 2) Kamau, G., Murugi, E, Gitau, J. (Technical University of Kenya). Assessment of Digital Library Services in Poverty Alleviation among the Youths.

THEME	ENTREPRENEURSHIP AND STRATEGIC BUSINESS (A)
Chair	Dr. Mary Maina
Rapporteur	Mr. John Douglas

- 1) Maina, E.W¹, Muriithi, R. W.², Kinyua, P.G³(¹Kirinyaga University, ²Dedan Kimathi University of Technology). Transformational Leadership and Employee Performance in Sacco's in Nyeri County, Kenya.
- 2) Oketch, J. O., Okeyo, W. & Kihuri, T.(Management University of Africa, Kenya).Entrepreneurship and Strategic Business Management for Sustainable Development.

THEME	ENTREPRENEURSHIP AND STRATEGIC BUSINESS (B)
Chair	Dr David Kabata
Rapporteur	Joy Sarah

- 1) Kairu, J.K, Senaji, T. A, &Kirimi, E, K. (Kenya Methodist University). Internal Versus External Orientation, Which Way for Competitiveness? Entrepreneurship and Strategic Business Management for Sustainable Development.

- 2) Gathitu, C.W. (Kirinyaga University). Influence of Youth Enterprise Development Fund on the Growth of Entrepreneurial Group Based Youth Enterprises in Nairobi County, Kenya.
- 3) Mburu, R M¹, Githira, C². (1Nyeri TVET, 2University of Embu). Effect of Value Chain Design on Performance of Improved Indigenous/Kienyenji Chicken's in Kirinyaga County.

THEME	EDUCATION FOR POVERTY ALLEVIATION
Chair	Dr Stephen Kamau
Rapporteur	Ms. Grace Chomba

1. Muhavi, S. & Achoka, J.S.K. (Masinde Muliro University of Science and Technology). Technical, Vocational Education and Training for Poverty Alleviation in the 21st Century: Challenges and Prospects for Kenya.
2. Chemwei, B¹, Koech, S. J². (1Kirinyaga University, 2Baringo County Assembly). Influence of Training Practices on Job Satisfaction of Security Guards in Public Secondary Schools in Baringo County, Kenya.

END OF CONFERENCE, 2021

SUB THEME: WELLNESS, EPIDEMIOLOGY, VACCINOLOGY, IMPACT & GLOBAL RESPONSES TO CORONA VIRUS PANDEMIC, INFECTIOUS AND RESPIRATORY DISEASES.

Seasonality of Enteric Bacterial Pathogens and Antimicrobial Resistance Profiles among Diarrheic Children in Nairobi City, Kenya

Webale, K. M^{1*}, Guyah, B², Wanjala, C³, Munyekenye, G⁴, Marwa, N. I¹, Ochieng', E¹, Shaviya, N³, Lokamar, N. P⁴, Webale, K. S², Kitungulu, N⁶, Kiboi, N⁷

¹Kirinyaga University, ²Maseno University, ³Masinde Muliro University of Science and Technology, ⁴Ministry of Health, ⁵Masinde Muliro University of Science and Technology, ^{6,7}Kenyatta University, Kenya

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Abstract

Although enteric bacterial pathogens are a leading cause of diarrhea in children under five years, their distribution and antimicrobial resistance is characterized by seasonal variation. This cross-sectional study determined seasonal variation of enteric bacterial pathogens and their antimicrobial resistance among diarrheic children during the dry (n=218) and rainy seasons (n=156) in Nairobi city, Kenya. Stool microbiology tests were used to diagnose enteric bacterial pathogens. Antimicrobial resistance was determined by disk diffusion test. Prevalence of diarrheagenic *E. coli*, in particular enteroaggregative *E. coli* (EAEC) and enterotoxigenic *E. coli* (ETEC), was higher during the dry season ($P<0.05$). While the prevalence of *Shigella* species infections did not differ significantly across the seasons ($P=0.997$), prevalence of *Shigella/E. coli* co-infection was significantly higher during the dry season ($P=0.012$). Antimicrobial resistance rates of diarrheagenic *E. coli* to ampicillin, amoxicillin/clavulanic acid and erythromycin was higher while that of ciprofloxacin was lower during the rainy season ($P<0.05$). Antimicrobial resistance rates of *Shigella* species to ampicillin, ceftriaxone, streptomycin and erythromycin was higher during the rainy season ($P<0.05$). There is seasonal variation in diarrheagenic *E. coli*, particularly EAEC and ETEC, and co-infection with *Shigella* species. Diarrheagenic *E. coli* and *Shigella* species showed seasonal trend in resistance to four commonly prescribed antibiotics.

Keywords: *Seasonality, enteric bacterial pathogens, antimicrobial resistance.*

COVID-19 Pandemic Silver Lining in the Context of Infectious Disease Control Africa Nderu, D.

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Abstract

Corona Virus-19 disease (COVID-19) is an acute respiratory syndrome caused by Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Since the first reported cases in Wuhan China, COVID-19 has had a negative impact across the globe, namely shutdown of schools, Air travel as well as lockdown of cities and countries. It has also stretched the health care system to the brink of collapse, particularly in some European countries and North America. Africa, surprisingly, continues to experience a low COVID-19 burden despite having a weak health care system. Some of the strategies currently being implemented to control COVID-19, face masks and hand hygiene, are not disease-specific. This implies that the benefits of controlling COVID-19 are likely to transcend beyond this global pandemic. This, therefore, raises important questions on the plausible impact of COVID-19 control strategies on other infectious disease transmitted via person-to-person contact. Review of studies conducted so far has revealed that strategies being used in the fight against COVID-19 could reduce the incidence of soil-transmitted helminths, diarrhoeal disease and respiratory disease. This indicates that the present increased mobilization of resources towards provision of hand hygiene facilities and education during the COVID-19 pandemic could lead to behavioural change and help in the fight against gastrointestinal parasitic infections and respiratory diseases that are still endemic in sub-Saharan Africa including Kenya. Non-compliance to control measures may, however, undermine plausible benefits. Governments must therefore seize this opportunity and leverage the attention to personal hygiene as highlighted by COVID-19 to reinforce gastrointestinal parasitic infections and respiratory diseases control. Additionally, efforts to estimate disease incidence are needed to adopt control measures and ensure already limited resources are utilized effectively for control of COVID-19 and other infectious diseases endemic in Kenya and other African countries.

Keywords: *COVID-19 pandemic, infectious disease, Africa.*

Prevalence of Metabolic Syndrome among Inmates on Haart at Embu Prison Dispensary, Comprehensive Care Clinic

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Metabolic syndrome (MS) is a combination of interrelated risk factors of metabolic origin; the components include increased insulin resistance, obesity, dyslipidemia and hypertension. WHO defines HAART (highly active antiretroviral therapy) as a form of antiretroviral therapy for treatment of persons infected with HIV and whose use has decreased mortality and morbidity. Inclusion of protease inhibitors (PIs) and nucleoside reverse transcriptase inhibitors (NTRIs) have been linked to development of lipodystrophy and metabolic abnormalities. Despite the success of HAART, the prevalence of dyslipidemia, insulin resistance and fat redistribution have increased after its global scaling. Prevalence of MS among HIV –infected patients globally ranges from 17.0% to 45.4%, with most reports produced in developed nations. Disease of MS using the International Diabetes Federation is a rise in triglycerides greater than 1.7mMol/l, elevated fasting blood sugar greater than 5.6mMol/l and reduced HDL cholesterol less than 1.03mMol/l. There exists no data on prevalence of MS among the prison population in Kenya.

This study sought to determine;

- i. The serum concentration of fasting blood sugar, TC, LDL-C, HDL-C and triglyceride of patients on HAART
- ii. The BMI and blood pressure among patients on HAART
- iii. Different types of regimens to metabolic syndrome
- iv. Prevalence of MS in prisoners on HAART

This was a hospital based cross-sectional study of patients on HAART for at least six months. Prevalence of metabolic syndrome was at 14.3%. Of the 217 samples, 64.5% ($n=140$) were male and 35.5% ($n=77$) were female. Prevalence of MS was higher in female at 54.8% than males 45.2%. Distribution of MS by among 20-29, 30 – 39, 40 – 49 age groups was 21.6%. Of the cases, ages 50 – 59 had the highest prevalence at 24.3% which suggests an increase in the prevalence of MS with age. There was no significant difference between the type of ART used and the prevalence of metabolic syndrome among patients on HAART. Prevalence of metabolic syndrome among inmates on HAART was estimated at 14.3%. There was no significant difference between ART used and presence of metabolic syndrome among patients on HAART. There was a weak positive correlation between presence of metabolic syndrome and ART used. Using ANOVA no significant difference was demonstrated between sex on the presence of metabolic syndrome in patients on HAART.

Keywords: *Metabolic syndrome, inmates, haart, care clinic.*

A Sustainable Model for the Provision of Youth Friendly Sexual and Reproductive Health Services in Kenya: An Intergrative Review of Literature

Murigi, M, Mogale, R. S.& Moagi, M.

University of Pretoria, South Africa.

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Abstract

Globally, countries are mandated to provide Youth Friendly Sexual and Reproductive Health services to the youth. However, the world's prospect for achieving Sustainable Development Goals 3.7 and 5 is jeopardized by the growing youth population. This review was the first phase of a doctoral study which was intended to develop a sustainable model for provision of Youth Friendly Sexual and Reproductive Health services in Kenya. The aim of the review was to map out the state of knowledge on Youth Friendly Sexual and Reproductive Health services. A systematic literature review. The PICO\PICo formats guided the review was conducted guided by January 2012 to January 2020. CINAHL: Cumulative Index to Nursing and Allied Health Literature (EBSCOhost), PubMed and Cochrane databases were the search platforms for electronic evidence. Thematic analysis was used to synthesis evidence. A total of 653 studies were identified during the search strategy but only 30 studies were selected after filtering for review. Worldwide, young people's sexual and reproductive health problems are similar. Replicated barriers to sustained provision of youth friendly services included: poor appointment times, unavailable commodities, poor acceptability mostly due to cultural and religious reasons, inaccessibility, and lack of health service providers training on youth sexual and reproductive health issues. From the review, a targeted approach to provision of the services generated better outcomes than an integrated approach. Considerations such as the involvement of the youths before, during and after receiving the services at the delivery sites should be underscored. To achieve sustainable change, a sustainable model for the provision of youth friendly services is the entry point to prevention and improving young people's sexual and reproductive health issues.

Keywords: *Youth friendly services, sexual and reproductive health, sustainable model.*

Influence of Consequences Frame on the Perception of Obesity among Middle-aged Women in Nairobi County, Kenya

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Abstract

Obesity is a complicated condition considered an epidemic and global issue of concern. It is said to be related to several influences such as behavioral, cultural, genetic, social and environmental influences. Obesity is usually defined in terms of body mass index (BMI), calculated as a person's weight in kilograms divided by height in meter squared (Brun, McCarthy, McKenzie & McGloin, 2015). For instance, a person is considered obese when the BMI is at or above 30 kg per meters squared. This study sought to establish the influence of consequences frame on the perception of obesity among middle-aged women in Nairobi County, Kenya. The one-group pretest-posttest experimental design was used. All study participants provided with the same treatment and assessment. Data was collected using the pre-and posttest questionnaires. The treatment administered was a television program titled *Slimpossible*, which showcased middle-aged Kenyan women suffering from the stigma of obesity and who were participating in a competition to lose weight. The multi-stage cluster sampling technique was applied in this study. Of 1848 participants, 317 were female academic staff in three public universities in Nairobi County, Kenya. Data was analyzed using the Statistical Package for Social Sciences (SPSS) version 23.0. Physical, psychological consequences and social consequences significantly influenced the perception of obesity, except for economic consequences, which had no relationship with the dependent variable. Based on the quantitative analysis, it was concluded that consequences of obesity are important factor to consider when designing and targeting media messages and media campaigns. The results indicate that the affected. Obese individuals are more receptive to change behaviour change if they become aware of the existing consequences of obesity.

Keyword: *Obesity, middle-aged women, Nairobi county, Kenya.*

Youth's perspectives on a Sustainable Model for the Provision of Youth Friendly Sexual and Reproductive Health Services in Kenya: A Quantitative Approach.

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¹ Kirinyaga University, , Kenya, ² University of Pretoria, South Africa

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Abstract

Nearly half of the world's population comprise youths. However, addressing their Sexual and Reproductive Health (SRH) remains a challenge. Globally countries are mandated to continually provide Youth Friendly Sexual and Reproductive Health services (YFSRHs) to the youth. The objective of this study was to assess and describe youth's perspectives on a sustainable model for the provision of YFSRHs in Kenya. Data was collected among 400 youths aged 18-24 years in Embu and Kirinyaga counties, Kenya. A structured questionnaire was used to collect data. Data was analysed using SAS statistical software version 9.4. Statistical threshold of $P \leq 0.05$ was used. Overall the mean age of the study participants was \pm standard deviation (SD) 21.2 \pm 1.86 years. Majority of the participants' perspective on the health care system sustainability was that the waiting time at the facility should be less than an hour, accessible geographically (less than a kilometre), affordable (\leq 20 Ksh.), and convenient working hours (weekday and weekends ratio 1:1). Advocacy was on health care provider's attributes of politeness, welcoming, confidential and non-judgmental. The most preferred locations for the youth friendly centres by the participants were community and school based locations. Similarly, parental and community support was reported to highly contribute to sustained utilization and provision of the YFSRHs ($P < 0.001$). Unlike popular beliefs, 99.8% did not see the need for recreational facilities at the youth centres to ensure sustainability of the model. To ensure a sustainable model for the provision of YFSRHs, there is need for a multi-sectoral and stakeholder involvement that is; youth, health care system structure, health care service providers, parents and community. Further research is needed on parents and health care service provider's perspectives on how to sustain the provision of YFSRH services.

Keywords: *Youth's, sexual and reproductive health, youth friendly services, sustainable model.*

Control of Bacterial Pathogens Isolated from Water Using Actinomycetes Extracts at Egerton University, Kenya

Waithaka, P. N.¹, Gathuru E. M.², Muriuki, B. G.², Kamunyi, J. N.².

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Abstract

Diseases are the worst enemy to man currently. This study aimed at isolating pathogenic bacteria from shallow wells in Dundori Kenya and testing the isolates for sensitivity to antibiotic metabolites previously extracted from Actinomycetes isolates from soils of Egerton University. Water samples were collected from shallow wells randomly selected from Dundori and labelled A, B, C, D, and E. Bacterial pathogens were isolated using membrane filtration technique. The isolates were characterized using biochemical means. Antimicrobial sensitivity testing was carried out using Kirby Bauer disk diffusion method. Data analysis was carried out using the Statistical Package for Social Sciences (SPSS). Comparison of means was carried out using one-way ANOVA. Shallow wells B, D and E were highly contaminated with pathogenic bacteria. Biochemical characterization of the isolates indicated that the most common isolates were *Vibrio cholera*, *Klebsiella pneumoniae*, *Proteus sp*, *Escherichia coli*, and *Staphylococcus aureus*. There was no significant difference between the zones of inhibition produced by the antibiotic metabolites ($F=2.149$ $P=1340$) when tested against the test isolates. There were no significant differences between the MIC's of the antibiotic metabolites on the bacterial pathogens ($F=2.01$ $P=0.15$). Water from some shallow wells in Dundori is highly contaminated with *Klebsiella pneumoniae*, *Escherichia coli*, *Proteus sp.*, *Vibrio cholerae* and *Staphylococcus aureus*. The pathogens were effectively controlled using antibiotics from the Actinomycetes. There is a need to sensitize the residents of the study area on ways of preventing seepage of contaminants into the shallow wells.

Keywords: *Bacteria, Egerton, control, pathogens, isolation, water.*

**Factors Affecting Adherence to Antiretroviral Drugs among Adolescents [10-18] At
Ahero County Hospital, Kisumu County, Kenya.**

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Abstract

Appropriate use of ARVs has improved the lives of many HIV positive individuals. The effectiveness of HIV treatment depends on sustenance of high level of adherence to ARVs use. However, ARV regimens are often complicated and can be affected by varying dosing schedules, failing to have proper dietary requirements and patients developing adverse effects. The study seeks to determine the patients' demographic, social and economic factors influencing adherence to antiretroviral drugs among HIV/AIDS adolescents at Ahero subcount Hospital in Kisumu County. Using a cross sectional quantitative study. The study population will comprise of HIV positive adolescents receiving ART in Ahero sub County Hospital and aged between 10-18 years living with HIV/AIDS and who have been enrolled into care for more than one year. Qualitative methods of data collection will be used including key informants, focused group discussions and direct observation. The sample population will be 20 ALWHIV. Data will be analyzed and presented in charts tables and graphs and will be used to continuously evaluate the level of maturity of young HIV-positive patients and discuss at the appropriate moment, where and how to disclose their HIV status to them.

Keywords: *Antiretroviral drugs, adolescents, Ahero county hospital, Kenya*

Microbial Degradation of Plant Waste Materials Using Actinomycetes Isolated from Egerton University Soils in Kenya.

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Abstract

Every harvest season, comes with a lot of plant waste material that have a negative effect on the environment. The rate at which bacteria and fungi in the environment decompose these wastes is low. This study isolated actinomycetes from soils obtained from Egerton University and tested the actinomycetes for their ability to decompose plant wastes materials. Soil samples were collected from field 7 in Egerton University, Kenya. Actinomycetes were isolated using starch casein agar medium and coded EU followed by a number. Maize stalk and *Grevillea* sp. leaves were collected from field 3 in Egerton University. One hundred grams of the plant materials was mixed with starch casein broth inoculated with the isolated actinomycetes in conical flasks and incubated in an orbital shaker at 28°C for 1 month. The materials were washed using 70% ethanol prior to drying in a hot air oven and weights determined. The isolate EU 10 presented grey aerial mycelia, EU 13 (Green), EU 15 (Grey) and EU 19 (White). The isolates presented varying morphological, physiological and biochemical characteristics. There was no significant difference in plant wastes degradation between isolates EU 10, EU 13, EU 15 and EU 19 ($F=11.49$, $p=0.07$). Actinomycetes from Egerton University had the potential of degrading maize stalk and *Grevillea* sp. leaves. There is need for massive isolation and screening of actinomycetes for production of metabolites that are capable of degrading plant waste materials.

Keywords: *Actinomycetes, degradation, isolation, microbes, plant wastes.*

Computational Screening of Zeolites for Adsorption of Selected Pharmaceutical Pollutants

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Abstract

Molecular simulations have been used as a screening tool to identify promising zeolites for removal of selected pharmaceutical pollutants. 40 zeolites with different structural and chemical configurations were studied. Galophosphate cloverite (CLO) of the chemical formula, $F_{24}Ga_9P_9O_{372}(OH)_{24}$, with pores of 20 rings and the lowest observed bulk density, showed exceptionally preferred adsorption of diclofenac [2-(2,6-dichlorophenyl) amino benzeneacetic acid), ciprofloxacin [1,3,7-Trimethylpurine- 2,6-dione] and chloramphenicol [2,2-dichloro-N-[(1R,2IR)-1, 3-dihydroxy-1-(4- nitrophenyl) propan-2-yl acetamide]. This selectivity was attributed to the geometry and structural composition of the cavities. We also investigated the most stable adsorbed compositions of the pollutants in the CLO zeolite. Our calculations showed that diclofenac, ciprofloxacin and chloramphenicol molecules are adsorbed into the pores with adsorption energies of -78.23, -173.68 and -84.46 kcal/mol respectively. Additional calculations were made to obtain detailed information on desorbed products. It was observed that dechlorination is the most energetically preferred process compared to dehydrogenation and dehydroxylation.

Keywords: Monte carlo simulation, adsorption isotherms, pharmaceutical pollutants, zeolites.

Effects of *Withania Somnifera* Root Extracts on Serotonin Secretion in Suiz Albino Mice

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Abstract

Pain is a common manifestation of presence of disease or physical injury in humans. High levels of serotonin in the plasma has been associated with pain. This study aimed at determining the effect of *Withania somnifera* root extracts on serotonin levels in Suiz albino mice. *W. somnifera* root samples were collected and ground to small pieces. Ethanol, n-butanol, xylene and methanol were used to extract metabolites from the ground root materials using hot extraction technique. Mice were injected with the extracts separately and serotonin levels determined over a period of 12 h at 2 h intervals. Serotonin concentration was determined using Beer Lamberts method. Light absorbance by the extracts varied significantly ($F = 50.2011$ $P = 1.25 \times 10^{-07}$). Concentrations of serotonin from mice injected with the metabolites from the selected solvents varied significantly ($F = 23.3269$ $P = 0.0000469$). Although, there was no significant difference in light absorbance values obtained by Panadol, methanol and ethanol extracts. ($F = 3.7178$ $P = 0.089$), extracts from *W. somnifera* had the ability to reduce serotonin levels in plasma. Further studies on the mechanisms involved in reducing serotonin levels by *W. somnifera* in blood need to be carried out. Because of this promising observation, there is need for mass production of metabolites from *W. somnifera*.

Keywords: *Withania somnifera*, root extracts, serotonin, Suiz albino mice.

Nurses' Attitudes Towards Pressure Ulcer Prevention Guidelines at a Referral Hospital in Kenya.

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Abstract

Pressure ulcers are among the leading causes of mortality and morbidity among bedridden patients globally. Prevention is cheaper than management and efforts should be geared towards prevention. The prevalence of hospital acquired pressure ulcers ranges between 2-38% globally. The aim of this study was to determine the attitudes of nurses towards pressure ulcer prevention guidelines, and establish the relationship between nurses' attitude and pressure ulcer prevention practice at Embu Level 5 Teaching and Referral Hospital in the month of July 2018. A descriptive cross-sectional research design was used and the tool for data collection was a self-administered semi-structured questionnaire. Data was analyzed using IBM SPSS software version 21. 118 nurses who were selected using stratified random sampling method. Permission to collect data was obtained from NACOSTI Ref no: NACOSTI/P/18/38217/22979. Majority (63.6%) of the nurses had a positive attitude towards the guidelines. Chi squared tests revealed that attitude did not significantly affect adherence to NCK guidelines ($P > 0.05$). Nurse's attitude was not a significant predictor of pressure ulcer prevention practice.

Keyword: *Nurses, attitudes, ulcer prevention, guidelines, referral hospital, Kenya.*

Challenges Facing Sustainable Clinical Mentorship among Nurse Mentors in the Clinical Areas

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Abstract

Nursing education professionals face myriad challenges in the 21st century in their effort to prepare student nurses to serve in a complex healthcare environment. Amidst the Covid 19 outbreak, it is unclear how clinical nurse mentors will guide the student nurses in low resource settings. This study explores the challenges facing sustainable clinical mentorship among nurse mentors in selected county hospitals in Kenya. A qualitative approach was used with a purposive sample of 20 nurses. Data was collected through key informant interviews and later analyzed thematically.

The three stages of mentorship (initiation, working and termination) was not well understood. The mentor-mentee relationship was not cordial and friendly. Training of mentors was not adequate due to lack of infrastructure and staff turnover. There was no harmonized working relationship and communication between the training institutions and the hospitals hence clinical teaching and assessments were not adequately coordinated. Large numbers of student nurses in the clinical areas lacked clear guidelines on the sustainability of clinical mentorship amidst the Covid 19 outbreak. Mentors should be equipped with core competencies and necessary resources including but not limited to well-equipped skills laboratories, well updated libraries with training manuals and modules in the hospitals as well as resource centers. Training of more mentors is necessary to sustain mentorship amidst the Covid 19 pandemic.

Keywords: *Clinical mentorship, nurse mentors.*

Soluble Betaglycan and Tgf-B Signaling in Human Endometrial and Endometriotic Cells

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Abstract

Endometriosis is characterized by presence of endometrial-like tissue outside the uterine cavity. The TGF- β superfamily, consisting of TGF- β s, activins and inhibins, is expressed in the endometrium and is putatively implicated in endometriosis. Betaglycan (BG), a membrane-bound co-receptor and modulator of the TGF- β superfamily ligands, especially of TGF- β 2. BG undergoes proteolytic cleavage to release soluble betaglycan (sBG) which often blocks TGF- β s in several physiological and pathological processes. We investigated shedding of betaglycan and its role in TGF- β family signaling in endometrial and endometriotic cell lines. Endometriotic epithelial (12Z) and endometrial stromal (THESC) cells were treated with increasing concentrations of TGF- β 1/ β 2 (1-10 ng/ml), activin A (5-50 ng/ml) or inhibin A (5-50 ng/ml). The level of sBG was evaluated using ELISAs after 24, 48 and 72 hours of stimulation. An ALK-4/5 inhibitor (LY364947, 10 μ M) was used to study the signaling pathways. Inhibition of BG shedding was analyzed using tissue inhibitors of metalloproteinases3 (TIMP3, 2.5-10 nM) besides a pan-MMP inhibitor (GM6001, 10 μ M). TGF- β 1/ β 2 along with activin A and inhibin A stimulation of 12Z and THESC cells resulted in a significant time- and dose-dependent reduction in BG shedding. Moreover, TGF- β 1/2 and activin A-mediated reduction in BG shedding in 12Z cells was found to be TGF- β type I receptor (ALK-5) and activin receptor type-1B (ALK-4)-dependent, respectively. Shedding of BG was significantly attenuated by TIMP3 in a dose-dependent manner and partially (~40%) by the pan-MMP inhibitor, signifying the involvement of matrix metalloproteinases in BG shedding. Collectively, our data suggest involvement of MMPs in shedding of BG and suggest potential involvement of sBG in modulating TGF- β 1/ β 2, activin A and inhibin A signaling in endometriotic and endometrial cells. The signaling mechanisms involved and possible roles in endometriosis merit further investigation.

Keywords: Soluble betaglycan, Tgf-B signaling, human endometrial, endometriotic cells

Health Provider-Patient Communication and People Living with HIV/AIDS: A Cross-Section Study from Homa Bay County, Kenya
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Abstract

Effective health provider- patient communication, a precursor to building a wholesome, trusting relationship, has been recognized as a vital factor in cultivating suitable self-management practices among patients with chronic infections like HIV/AIDS. This study investigated the level and determinants of doctor patients' communication in Homa Bay County. A cross-sectional hospital-based survey was conducted among 362 HIV/AIDS patients in Homa Bay County. Data was collected using a self-administered structured questionnaire. Cronbach's alpha and confirmatory factor analysis tests were used to ascertain the reliability and validity of study instruments, while the Chi-square test was used to establish the relationship between demographic factors and doctor patient communication. 51% of the respondents were females, with the majority, (30.9%) of respondents being in the aged 45 years and above. Most respondents described health provider-patient communication as effective (mean score 3.60, and SD 1.164. Gender, educational level, marital status, and illness duration were significantly associated with doctor patient communication in this study at p values less than 0.05. Majority of the respondents were concerned that the clinical officer/doctor was taking too fast (61.3%) and used medical terminologies that were difficult to understand (62.7% and seldom used pictures, drawings or models to explain issues (70.4%), all of which may reduce the effectiveness of doctor-patient communication. There is need to equip healthcare providers with effective communication skills, including ability to profile patients with inadequate health literacy and who may require special consideration, including taking more time with them and avoiding use of medical jargon during consultation.

Keywords: *Health provide, patient communication, people, HIV/AIDS, Homa Bay County, Kenya*

Zinc Ions in the Management of Endometriosis Pain

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Abstract

Zinc is one of the most abundant trace elements which plays a major role in genetic stability and function. It is found in cell nucleus, nucleolus and chromosomes where it is involved in stabilization of DNA, and RNA structure. In the cytoplasm, zinc is involved in stabilizing the ribosomes and forms part of many proteins and enzymes.

We investigated the role of zinc in the management of endometriosis pain through measurement of prostaglandins in endometriotic and endometrial cell line supernatants and serum samples. Immortalized human endometrial stromal (I-HESC), endometriotic stromal (22B) and epithelial (12ZVK) cell lines were used. Cells were Stimulated with various concentrations of zinc and fetal calf serum (FCS) to optimize the best zinc dosage and media for optimal growth. Supernatants were collected and serum from patients who were taking zinc to relieve endometriotic pain Levels of Prostaglandin E2 (PGE2) and PGF2 were measured in supernatants from cells treated with Zinc and serum from patients and controls. 5µM zinc and 1% FCS concentration were optimal for cell growth. Interestingly, endometriotic serum samples secreted higher levels of PGE2 compared to controls. PGF2 secretion in serum obtained from endometriotic patients and controls showed no significant difference.

This study underscores the importance of zinc in pain relief and need for further investigation.

Keywords : *Zinc ions. Management, endometriosis pain.*

Expression of Membrane-Type 2 and 3 Matrix Metalloproteinases in Endometriosis and Adenomyosis

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Abstract

Matrix metalloproteinases (MMPs) are a family of zinc-dependent endopeptidases capable of degrading the different components of the extracellular matrix, and are involved in different physiological processes such as cell proliferation, differentiation, angiogenesis, apoptosis and cell migration. Dysregulation of MMPs has been reported in a number of cancers. Consequently, we postulate that this might be replicated in the pathogenesis of endometriosis, since the two conditions share similar developmental stages. We investigated the expression pattern of MT2-MMP and MT3-MMP in ectopic endometrium of persons with and without endometriosis as well as their possible role in the pathogenesis of endometriosis. Tissue samples were obtained after surgery from healthy endometrium, endometrium with endometriosis and adenomyosis, deep infiltrating endometriosis (DIE), peritoneal endometriosis (PE) and ovarian endometriosis (Ov). Expression of the MT-MMPs was determined using immunohistochemistry. Both proteins were expressed in the glandular and luminal epithelial cells of endometrium of persons with and without endometriosis. There was no cycle-dependent differences in the endometrium of persons with and without endometriosis. Interestingly, there was enhanced expression of both MT2-MMP and MT3-MMP in adenomyosis. In contrast, MT2-MMP there was decreased in ovarian, peritoneal and DIE, decreased MT3-MMP in peritoneal and DIE compared to eutopic endometrium and adenomyosis. The equal expression of MT-MMPs in endometrium of persons with and those without endometriosis in contrast to the impaired expression in adenomyosis and ectopic lesions suggest that the changes occurred after and not before implantation. The altered expression of MT2-MMP and MT3-MMP in adenomyosis and ectopic endometrium suggest distinct interactions in the different environments.

Keywords: *Membrane-type 2 and 3, matrix metalloproteinases, endometriosis, adenomyosis.*

Co-Enzyme Q10 Down-Regulated Khat-Induced Toxicity in a Mouse Model Chepukosi, K. W¹., Nyariki, J. N¹., Jillani, N. E⁴., Okanya, P. W¹, ² Orina, I. A^{2,3}

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Abstract

Consumption of khat (*Catha Edulis*, Forsk) is on the rise despite the much publicized associated deleterious health effects. We investigated the effect of khat on vital physiological and biochemical processes such as oxidative stress, inflammation and immune responses and the role of Coenzyme-Q₁₀ (CoQ₁₀), a potent antioxidant and anti-inflammatory agent in modulating any negative effects due to khat exposure.

Forty (40) three (3) week Swiss albino mice were randomly assigned into four treatment groups (n = 10). The first group, the control was not exposed to khat or CoQ₁₀. The second group received 200 mg/kg body weight (b/w) of CoQ₁₀, the third group received 1500 mg/kg b/w of khat extract and the fourth group received 200 mg/kg b/w of CoQ₁₀ and 1500 mg/kg b/w of khat extract. The experiment was conducted for 90 days after which samples were collected for physiological and biochemical analyses. The effects of khat and CoQ₁₀ on the weights of brain, liver, kidney and spleen was determined. Administration of khat decreased the levels of RBCs and its subtypes (MCV, MCH, RDW-SD and RDW-CV), a clear indicator of khat-induced normochromic microcytic anemia. White blood cells (lymphocytes, monocytes, neutrophils and eosinophil) were markedly elevated by khat. Results provided evidence of khat-induced liver and kidney injury as shown by increased biomarkers; AST, ALT, GGT and creatinine respectively. Standard histopathological analysis confirmed these findings. Increased levels of the pro-inflammatory cytokine TNF-alpha and elevation of GSH in the brain, liver and spleen demonstrated khat induced inflammation and oxidative stress. Remarkably, this is the first study to demonstrate the potential of CoQ₁₀ in ameliorating khat-induced negative effects as outlined. CoQ₁₀ supplementation restored the khat-induced reduction in RBC subtypes, and was protective against liver and kidney injury as shown by the appropriate biomarkers and standard histopathology analysis. CoQ₁₀-driven normalization of GSH and TNF- α levels, demonstrated a protective effect from khat-driven oxidative stress and inflammation respectively.

We observe that CoQ₁₀ may be useful in ameliorating khat-driven deleterious events among chronic khat users.

Keywords: *Co-enzyme Q10, down-regulated khat-induced toxicity, mouse model.*

Evaluating a Novel High Throughput LAMP Assay against Nested PCR for Detection of *Plasmodium Falciparum* Infections

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Abstract

As Malaria incidences continue to decrease globally, WHO calls for countries to move from pre-elimination to elimination state effectively endorsing an ambitious goal of achieving global malaria elimination and eradication. Achieving this milestone requires identification and treatment of all parasite carriers, both symptomatic and asymptomatic hence the need for high throughput diagnostic, with capacity to detect low parasitemias to enhance diagnosis of asymptomatic cases in the early stages of infection especially in non-endemic areas that play a major role in malaria transmission. We evaluated a high-throughput LAMP assay for detection of low *plasmodium falciparum* infections. A total of 134 samples obtained from a previous study conducted in Busia County, Kenya were utilized for this evaluation. Samples were screened using HT-LAMP PCR assay designed to detect *Plasmodium falciparum* and compared with Nested PCR. Results indicated that HT-LAMP has a sensitivity of 92.1%, specificity of 100%, a positive predictive value of 100% and a negative predictive value of 97%. HT-LAMP exhibited a strong agreement with nested PCR ($k=0.943$). HT LAMP thus showing superior diagnostic capacity just like that of Nested PCR suggesting it can be used in field surveillance to complement malaria elimination interventions. Further optimizations should also be explored to make a multiplex HT-LAMP assay that can detect other *Plasmodium* species as well as lyophilization of the reagents for ease of field application.

Keywords: Malaria, molecular test, asymptomatic malaria, Busia, HT-LAMP PCR, nested PCR

Molecular Characterization of Four Antibiotic Producing Actinomycetes Isolated from Menengai Crater

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Abstract

Multi-drug resistant pathogens are a leading cause of human morbidity and mortality all over the world. We isolated actinomycetes from the soils of Menengai crater and characterized selected actinomycetes using classical and molecular techniques. Actinomycetes were isolated using starch casein (SC), Luria Bertani (M1) and starch nitrate (SN) agar media. Screening for antibiotic activity was carried out by primary screening using perpendicular method and secondary screening using agar plug technique against selected bacterial and fungal pathogens. The best actinomycetes based on size of inhibition and broad spectrum of activity coded PAN 25, PAN 41, PAN 75 and PAN 110 were selected for further bioassay. The selected actinomycetes were characterized using molecular technique that involved extraction of 16S rRNA gene, PCR and phylogenetic studies. Data was analyzed using Statistical Package of Social Sciences (SPSS) software. There was a significant difference in the number of actinomycetes isolated using the three types of media ($F=3.315$ $P=0.04218$). There was no significant difference in the zones of inhibition between the isolates PAN 25, PAN 41, PAN 75 and PAN 110 ($F=0.8928$ $P=0.5431$). Molecular characterization revealed that isolate PAN 25 had 99% similarity with *Streptomyces variabilis*, isolate PAN 41 (*S. indiaensis*), isolate PAN 75 (*S. luteoigriseus* strain ZG728) and isolate PAN 110 (*S. acrimycini* strain K30). Menengai crater had actinomycetes that inhibited growth of the selected actinomycetes. Large scale production of antibiotics from the selected actinomycetes should be carried out.

Keywords: Actinomycetes, antibiotics, characterization, Menengai, molecular, sensitivity.

Barriers to Diabetes Foot Care Practices among Diabetes Patients Attending Diabetes Clinic in Embu County, Kenya

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Abstract

Diabetes mellitus is becoming a major public health concern of the 21st century globally, with disproportionately great socioeconomic liability globally. Prevalence continues to rise resulting in significant morbidity and mortality. This has been associated with the development of chronic complications such as cardiovascular, eye, renal diseases and foot problems. Foot ulcerations related to peripheral neuropathy and vascular disease has led to distressing health consequences as well as amputations among the diabetics. This study aimed at establishing barriers to foot care practice among diabetes patients attending diabetes clinic in Embu County, Kenya. A descriptive survey targeting a population of 1413 type 2 diabetic patients and 12 key informants was the target population of the study. From this, a sample size of 301 participants and 12 key informants were drawn to take part in the study using fischer et al formular. Participants were sampled from the selected DM clinics. Self-administered questionnaires and focused group discussion was used for data collection. Data was thematically analyzed and results presented in narration and tables. Major barriers identified were impaired vision and knowledge deficit. This was backed by health care provider perception barrier that; health education given had little effect on foot care practices. Evident from the findings was inadequate delivery of services due to staff shortage as well as a communication barrier and patient's negative attitude. Intensive campaigns on the practice of the recommended diabetic foot care practices in management of diabetes are suggested with human and material resource support from the government.

Keywords: *Barriers, diabetes, foot care practice, patients, clinic, Embu county, Kenya*

Microbial Degradation of Polythene Using Actinomycetes Isolated from Maize Rhizosphere, Forest and Waste Damping Sites Within Egerton University, Kenya.

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Abstract

Polythenes are used in many spheres of human life such as packaging of commodities, construction of green houses and ponds among other uses. When not properly disposed, they contaminate the environment since they are not easily biodegraded. In this study, polythene papers were buried around growing maize, in the forest and in waste damping sites. Soil samples were separately collected from the three sites, packed in sterilised polythene bags and taken to the laboratory for isolation of actinomycetes. The soils were dried on the bench for one week. Actinomycetes were isolated using starch casein agar. Characterization of the isolates was carried out using cultural, physiological and biochemical means. The polythenes were subjected to degradation by the actinomycetes by placing them in conical flasks having starch casein broth followed by incubation in shaking conditions at 30°C for one week. Three groups of potential actinomycetes were isolated from maize soil (EU10, EU15, EU19), forest soil (EU3, EU8, EU13) and damping site soil (EU21, EU25, EU30). The isolated actinomycetes had varying microscopic, physiological and biochemical characteristics. There was no significant difference in polythene sheets degradation between maize, forest and damping site soils ($F=38$, $P<0.05$). However, there was significant difference in the polythene sheets degradation among the actinomycetes ($F=11.49$, $P=0.03$). Actinomycetes from the soils of Egerton University had a great potential of producing metabolites that degraded polythenes. There is need for massive isolation and screening of the actinomycetes for production of metabolites that are capable of degrading polythene.

Keywords: *Actinomycetes; degradation; Egerton; Kenya; polythene; rhizosphere.*

The Participation of Adolescents in HIV-Related Research: Experiences of Researchers and Regulators in Western Kenya

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Abstract

Despite the numerous policy developments to improve provision of SRH services and research among adolescents and young people in Kenya, researchers still face significant challenges with research involving adolescents. This has led to neglect of an important segment of the population especially in HIV research. We explored ways of addressing the challenges that affect fair inclusion of adolescents in HIV-related studies in Western Kenya using a cross-sectional research design. This was a qualitative study that involved 27 participants purposively sampled from Moi University, Moi University College of Health Sciences (MUCHS), Academic Model Providing Access to Healthcare (AMPATH), Moi Teaching and Referral Hospital (MTRH), and MU-MTRH/IREC at Eldoret in Western Kenya. Qualitative data was obtained through in-depth oral interviews and analyzed in line with the study objective. There were a number of challenges in HIV-related studies involving adolescents. However, data triangulation showed variations in how the challenges were viewed from the perspective of the researchers and regulators. We identified a number of strategies that had been developed to address the challenges including ethical dilemmas that called for education, experience, and collaboration between the researchers and regulators. Lessons obtained from the researchers and regulators in Western Kenya are important in providing insights needed in addressing the challenges affecting fair inclusion of adolescents in HIV-related research.

Keywords: *HIV/AIDS, adolescents, ethical challenges, experiences.*

Challenges that Affect Fair Inclusion of Adolescents in HIV-Related Research: A Case of Western Kenya

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Abstract

Adolescents in sub-Saharan Africa bear a disproportionate burden of HIV/AIDS. While the region has the fastest growing number of people infected with HIV/AIDS, adolescents represent 60% of all these new infections. Although there is growing recognition that adolescents constitute an important target group for HIV preventive efforts, numerous challenges affect fair inclusion of this population in HIV-related research. This study sought to identify ethical-legal and contextual challenges that affect fair inclusion of adolescents in HIV-related research in Western Kenya, and examine how the identified challenges may be addressed. We used a cross-sectional research design. This was a qualitative study that involved 27 participants purposively sampled from Moi University, Moi University College of Health Sciences (MUCHS), Academic Model Providing Access to Healthcare (AMPATH), Moi Teaching and Referral Hospital (MTRH), and MU-MTRH/IREC at Eldoret in Western Kenya. The qualitative data was obtained through in-depth oral interviews that were analyzed in line with the study objective. Ethical-legal challenges encountered by researchers and regulators emanate from the gaps in law and research guidelines. These challenges are further compounded by contextual-ethical challenges occasioned by contextual factors which include, the intricate clinical nature of HIV/AIDS, stigma around adolescent sexuality and HIV/AIDS, and certain cultural practices like early marriages. These challenges affect fair inclusion of adolescents in HIV-related research. Challenges that affect fair inclusion of adolescents in HIV-related research arise from a complex web of ethical-legal and contextual factors. While researchers and regulators have come up with strategies to address the challenges, ethical dilemmas require the collaboration of both the researchers and regulators.

Keywords: *HIV/AIDS, adolescents, fair inclusion, ethical challenges*

Investigation and Prosecution of Sexual Offences in Relation to Forensic Medical Evidence in Kiambu County, Kenya
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Abstract

Kenya police annual reports show that sexual offences are escalating in Kenya. This study was done to find out the challenges the police officers within Kiambu County faced in the course of evidence collection, investigation and prosecution of sexual offences in Kiambu County, Kenya. The research involved conducting interviews and administration of Likert scale questionnaire for police officers trained on handling sexual offenses as the key informants, and use of data abstraction tool to collect data from the police record files in the year 2016. Analysis of P3 forms indicated that 50% of reported victims had hymen broken, 40.9% had genital lacerations and 9.1% had hymen intact. It was established common laboratory tests ordered in rape cases are: high vaginal swab (77.3%), HIV (95.5%), pregnancy (77.3%) and DNA analysis (13.6%). Great amount of evidence (77%) collected in rape investigation is not sent to forensic laboratories for analysis. The other setbacks included lack of collaboration between the police gender department and other government agencies like health facilities handling cases of sexual offences, and inadequate support for the gender offices to effectively handle cases of sexual offences. Only a third of reported sexual offence cases reach full trial. Inadequacies were observed in filling of the P3 and Post Rape Care (PRC) forms and there was lack of adherence to chain of custody in evidence handling. Challenges in investigation and prosecution of sexual offences adversely affects justice for the victims. Recommendation for continuous specialised training to clinicians on forensic medical evidence, infrastructural upgrade, modern tools for gender departments and a multidisciplinary approaches in handling sexual offences.

Keywords: *Prosecution, sexual offences, forensic medical evidence, Kiambu county, Kenya.*

Establishment of Global Responses to Corona Virus Pandemic**Mwita, G. M., Lewa, C. R., & Mong'osi, D.***Eldoret National Polytechnic, Kenya***Correspondence:** *maroagospel@gmail.com***Abstract**

Pandemics are large-scale outbreaks of infectious disease that can greatly increase morbidity and mortality over a wide geographic area and cause significant economic, social, and political disruption. Significant policy attention has focused on the need to identify and limit emerging outbreaks that might lead to pandemics and to expand and sustain investment to build preparedness and health capacity (Smolinsky, Hamburg, and Lederberg 2003). The Centers for Disease Control and Prevention (CDC) defines a pandemic as a disease outbreak that has spread across multiple countries and continents and usually impacts many people. All pandemics start as localized disease outbreaks that then begin spreading rapidly, and eventually around the world. The general objective of the study was to establish early warning system strategies for effective preparation and management of new pandemics. An Early Warning System (EWS) can be defined as a set of capacities needed to generate and disseminate timely and meaningful warning information of the possible extreme events or disasters that threatens people's lives. The study used documentary research design. This design allows desktop gathering of information from credible or peer reviewed secondary sources. The objectives of the study guided the nature of the information to be collected. In a conclusion, the government should Establish or strengthen the legislative/legal framework and mechanisms, developing effective communication strategies and Secure resources. We therefore recommend development of basic early warning infrastructures and capacities, promote education programs on pandemic mitigation and preparedness and integrate pandemic mitigation plans into broader development context.

Keywords: *Pandemics, early warning system, center for disease control and prevention.*

Contextual Factors Influencing Utilization of Antenatal Care Services by Pregnant Women at Enzaro Health Centre, Vihiga County, Kenya
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Abstract

Antenatal care contributes to good pregnancy outcomes and benefits of antenatal care depend on timing and quality of care provided. It reduces probability of maternal and fetal mortality and morbidity. This study sought to establish contextual factors influencing utilization of antenatal care services by pregnant women in Enzaro Health Centre, South Maragoli ward, Ideleri sub-location, Vihiga Sub-county, Vihiga County, Kenya. A descriptive cross-sectional study was conducted involving mothers with children under one year within the mother-child welfare clinic. Results showed that long waiting hours, delays due to difficult geographical terrain and poverty influenced utilization of antenatal services.

There is need to strengthen routines outreach services to the far catchment areas, home visits and defaulter tracing be strengthened and communication skills training be given to staff to improve staff client interpersonal relations at the clinics.

Keywords: *Antenatal Care, Pregnant Women, Enzaro Health Centre, Vihiga County, Kenya*

Knowledge, Attitude and Practice of school going children on Soil Transmitted Helminthiasis in East Kisumu Location, Kisumu County, Kenya.

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Abstract

Globally, approximately 1.5 billion people are infected with soil transmitted helminthes and more than half a billion children live in high transmission areas and are in dire need of treatment and control interventions. In Kenya, approximately 15 million people are infected. We evaluated the level of knowledge, attitude and practice of school going children towards soil transmitted helminthiasis. A descriptive cross-sectional study was conducted in Ziwani Learning Centre, Usomavillage in Kisumu County. The study population consisted of pupils aged 4-15 from Ziwani Learning Centre. There was relatively poor knowledge, attitude and practice of children towards soil transmitted helminths. 37 pupils (41%) had never heard about intestinal worms. There is a gap exposing the study population to risk of being infected or re-infected with soil transmitted helminths despite the gains made by the NSBDP.

Keywords: *Knowledge, Attitude, Practice, Soil, Helminthiasis Ziwani Learning Centre, Kenya*

Co-administration of Chloroquine and Coenzyme Q10 Improved Treatment Outcome During Experimental Cerebral Malaria

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Abstract

Development and severity of cerebral malaria (CM) is driven by parasitemia levels, harmful inflammatory response, oxidative stress and consequent breach of the blood brain barrier. Use of adjunct therapy that utilizes a powerful antioxidant and anti-inflammatory agent alongside chloroquine (CQ), may improve treatment outcome and shorten recovery from post-infection sequelae. Though withdrawn in some countries, CQ is still in use for prophylaxis and treatment of malaria in many countries where resistance has not been reported. In the current study, we tested whether oral co-administration of 50mg/kg chloroquine (CQ) and 200 mg/kg coenzyme Q10 (CoQ10) would improve treatment outcome against experimental cerebral malaria (ECM) and assuage the deleterious effects of oxidative stress and inflammation upon infection by *Plasmodium berghei* ANKA (PbA) in C57BL/6J mouse model. The mice were divided into five groups as follows: group one was used as the control, group two was infected with PbA, group three was supplemented with CoQ10 prior and after infection with PbA, group four was also supplemented with CoQ10 prior and after infection with PbA infection and was treated with CQ. Group five was infected with PbA and treated with CQ. Treatment with CQ + CoQ10 resulted in an improved parasite elimination; clearing the parasite one day early, when compared to mice on CQ alone. Mice infected with PbA alone had markedly elevated serum levels of TNF- α and IFN- γ . Remarkably, that elevation was abrogated in infected mice that received CQ and CoQ10 separately or in combination, an indication of protection from ECM progression. Furthermore, CQ and CoQ10-administration, blocked parasite-driven elevation of vital liver enzymes and proteins; aspartate transaminase (AST), alanine transaminase (ALT) and bilirubin. Elevation of AST, ALT and bilirubin is characteristically associated with liver damage. In the presence of CQ and CoQ10 severe PbA-induced systemic induction of oxidative stress and resultant GSH depletion was reduced in the brain, liver, spleen, and kidney. Overall, these findings demonstrate that administration of CQ and CoQ10 ameliorates harmful parasite-driven oxidative stress and inflammation, while slowing the progression to full blown ECM. The implication of these findings is two-fold: controlling lethal oxidant damage due to oxidative stress and inflammation, may improve treatment outcome in CM. Secondly, an adjunct therapy utilizing a powerful antioxidant such as CoQ10 may be beneficial in CM when used alongside CQ.

Keywords: *Chloroquine, Coenzyme Q10, oxidative stress, inflammation, experimental cerebral malaria*

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 disorder characterized by states of hyperglycemia with disturbances of carbohydrates, fat and protein metabolism. Diabetes affects millions of people globally and the prevalence of the disease is on the rise due to unhealthy diet and lifestyle. The disorder results in chronic complications including cardiovascular diseases, diabetic nephropathy, 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, economic and social factors have been implicated in the development of complications. This study aimed at assessing the effect of social cultural and economic factors on the practice of secondary diabetes prevention among T2DM patients at Consolata Hospital Nkubu and Meru Level Five Hospital. 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 was 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 secondary level of education and majority 67% was employed. Concerning secondary prevention, majority paid for 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.*

SUB-THEME: REVOLUTIONIZED INNOVATIVE ENGINEERING AND TECHNOLOGY FOR SUSTAINABLE DEVELOPMENT

Real Time Monitoring and Control of Scale Formation in the Geothermal Energy Generation Systems.

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Abstract

Exploration of Geothermal power has gained momentum in the recent past as it has proved dependable, has reduced green gas emissions, met diversification needs, provides least cost base load mode of power generation and is inexhaustible for billions of years to come. However, the development and exploitation of geothermal resource face a notable challenge of scale formation on the steam lines and most surface equipment, leading to reduced and expensive production. Scaling occur mainly due to deposition of solids carried by steam. One of the important scale solubility factor is the pH of the brine. Low pH levels are associated with Non Condensable Gases (NCGs) carryover which enhances scaling. Reduced production due to scaling is demonstrated. For example, it was established from Olkaria production logs that from Nov 2018-Feb 2019, when the unit was experiencing scaling, KenGen lost a total of 7,825,685KWh translating to US\$ 688,660.28, considering electricity sale price as 0.008 US\$/ Kwh due to scaling. The recent used strategies like use of Organic Rankine Cycle (ORC) bottoming plant to the existing facility for initially designed geothermal systems, use of combined cycle plants and pH mod has led to reduced scaling and additional production. ORC involves use of heat exchanger and a secondary working fluid to drive turbines. pH mod involves online monitoring and control of silica in the reinjection pipelines using a chemical process treatment equipment. Combined cycle technology involves use of a steam turbine and ORC technology in one plant. ORC is not typically cost effective especially for modular wellhead plant while pH mod considers only scaling in reinjection pipelines. This means that scaling challenge is still at large especially for initially installed single flush geothermal stations like Olkaria II leading to losses of large amount of energy.

This study explored the design and implementation of a real time scale level monitoring and control for geothermal energy generation system based on a physical T5554 analytic process control system. A virtual system was designed using Siemens NX and programmed using Totally Integrated Automation (TIA) software, PORTAL V14 via Programmable Logic Controller -1200 PLC, CPU 1214C DC/DC/DC 6ES7 214-1AG40-OXBO hardware. A set point pH of 6.5, an appropriate point to prevent scaling, as guided by the practice in Olkaria II was used with the PID of the PLC to control the pH of the analytic process control system. The virtual and the physical model were linked to achieve communication through a channel called Open Platform Communication (OPC) via KEP server, which is an interoperability standard for secure and reliable exchange of data in industrial automation. Siemens NX design was configured to communicate with KEP server via External Signal Configuration feature. This facilitated the merger of control signals between Siemens NX design and TIA design. The TIA portal used links that specified the sensor and actuator control signals. The system was

verified by pH readings of the two systems. The pH Data of the of the two systems indicated a standard deviation of $8.25578E-4$ before acidic condition correction by the metering pump and a standard deviation of 0.01325 upon correction. The time lag was so small that it did not affect the working of the system. This confirmed that the digital model could be used to accurately represent the physical system and achieve scale monitoring and real time control through managing the always changing brine pH in geothermal fields.

Keywords: *Real time, monitoring, control, scale formation, geothermal energy generation systems.*

Power Quality Model of Distributed Networks Integrated with Renewable Energy Sources

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Abstract

The integration of renewable energy sources (RES) into the power system distribution network have proven to be beneficial to all the power sector players. These include: reduced greenhouse gas emission, reduced transmission and distribution losses, delivery of clean power to consumers due to close proximity of loads to the generators, and deferred investments by distributed network operators. The continued integration of RES has been enhanced by inability of conventional energy to meet increasing power requirements, need for clean energy, low power generation costs due to technological advancements, and favorable government policies encouraging investment in renewable energy sector. This integration however, necessitates re-configuration of distribution network since RES cause reversed power flows, instability among other power quality concerns. This transformation will rely on studies conducted on the behavior of grids integrated with renewable energy sources. We examined the impact of integration of solar, wind and gas micro-turbine generators. on harmonics and flicker of low voltage (LV) and medium voltage (MV) networks. This was realized by integrating the RES at selected locations of the IEEE-33 bus system and carrying out harmonic and flicker analysis using DigSILENT Power Factory software. Results showed increased harmonic distortion and flicker levels on LV and MV networks dependent on the type, location, penetration level and whether a single-type of RES or combination of RES was installed.

Keywords: *Renewable energy sources, IEEE 33-bus distribution network, power quality analysis.*

Could Renewable Energy Support Service Delivery during COVID-19 Pandemic in Kenya?

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Abstract

COVID-19 pandemic shocked the whole world, causing unrecoverable damage; including social and economic constraints. Consequently, schools, Industries, worship centers, flights suspend and key government offices remained closed or remained operationally minimally. In urban centers the virus seems to spread so fast due to high population forcing organizations/employers to adopt work from home approach to avoid spread of the Virus. This ensured companies/organization remained economically/financially viable and essential services were provided. Unfortunately, power outages in urban centers remained rampant, effecting remote working and service delivery. Thus whereas Estates in urban centers have no power backups and therefore rely on a single source of power, Limited power connectivity in rural areas delayed service delivery especially in hospitals and remote working could not be realized in rural setups. Utilization of renewable energies (solar wind and biomass) could provide alternative sources of energy and help combat spread of COVID-19 Virus, as hospitals and other institutions could have reliable power, use solar powered hand-wash and sanitizer dispensers, water pumping using solar and telecommunication sector that promotes remote working in rural areas. Providing power from renewable sources in rural areas by constructing micro grid or off grids systems would have decongested urban center potentially reducing rate of virus spread rate.

Keywords: *Renewable energy, COVID-19, micro grid, off grid.*

Design and Fabrication of a Solar Powered Touchless Temperature Monitoring and Hand Sanitizing Device

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Abstract

With the current rise in cases of COVID-19, temperature monitoring and hand sanitizing has become tedious at the entrance of the universities, schools and other busy public institutions. This process is time consuming and requires human resource to ensure everyone complies with the covid19 guidelines. In addition, there has been a lot of human to surface contact during hand sanitizing when pressing the sanitizer dispensers' button or opening hand wash taps. To address the above issues, we designed a programmable device that will be placed at the main entrance of Kirinyaga University to check the temperature and sanitize hands of people getting into the university without human to surface contact. The device deploys an obstacle sensor that is programmed to detect the presence of hand and in turn trigger the temperature sensor to check temperature and switch on the pump to dispense sanitizing liquid concurrently. The device will be fitted with a buzzer that will sound an alarm when it detects a person with temperatures above 37°C. This device is aimed at reducing congestion at the main entrance of the university since temperature check and sanitizing is done concurrently. Introduction of this device will also reduce the employees stationed at the entrance since it can perform their task with ease using solar energy hence is economical to run. In future the device will be fitted with a data logger system that will track and store information of the staff or students found with temperatures above 37°C.

Keywords: *Microcontroller*

Real-time Navigation for Quad-copter engaging a Target Muchiri, N.

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Abstract

Navigation of a quad-copter while engaging a target is the main focus of this paper. The problem analyzed here is that of a quad-copter pursuing and loitering around a target. Its solution involves development of a trajectory generation algorithm system for real time generation of navigation waypoints and a control system for quad-copter to track the waypoints. The algorithm is simulated in a computer and executes in real time to achieve multiple iterations that navigates the quad-copter to the desired location. The simulation results are presented for the pursuing quad-copter and target in all possible locations in different quadrants. The system successfully navigates the quad-copter from an arbitrary location within the defined field to the target location and encircle the target within required time hence producing a smooth navigable path.

Keywords: *Online navigation, quad-copter, real time tracking.*

Finite Element Analysis of Induced Residual Stresses (IRS) During Turning of Aisi 1020

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Abstract

Research towards finding solutions to save energy and adopt sustainable machining processes continues to increase. However, conventional method of experimental measurement and analysis of induced residual stresses still remains expensive and time-consuming. Modern machining techniques demands approaches that can improve quality of machined surfaces, minimize machining time and tool cost. Design of advanced finite element models that can be applied in prediction of optimal cutting parameters and minimize induced stresses for carbon steels is necessary to cut costs and time spent in carrying out experiments. We used finite element analysis software Deform 3D to create models. The 3D model was applied in the analysis of IRS of work material AISI 1020. The 3D cutting simulation was conducted by varying three parameters: depth of cut, feed rate and spindle speed. The effects of parameters on the induced residual stresses and stress profiles were analysed. Results showed that feed rate and depth of cut have greater impact on shear deformation and thus inducing residual stress on the surface and sub-surface layers of the turned workpiece. The simulation graphics, cutting forces and deformation at different strain rates obtained from the finite element analysis of models are discussed.

Keywords: *Turning, finite element, simulation, and induced residual stress*

Mapping of Point and Non-Point Sources of Pollution within Nairobi River Basin and Mbagathi Sub-Basin
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Abstract

Water is the source of life covering 70% of the Earth surface. However only a small portion of this precious natural resource is fit for human consumption. We mapped various point and non-point sources of pollution within Nairobi River Basin and Mbagathi Sub-basin, with aim of taking an inventory for future clean ups and protection of the basins. The water from the basins flow to Tana River basin downstream of Nairobi and Mbagathi Rivers. Nairobi River Basin (NRB) is traversed by several rivers that include; Ngong/Motoine, Nairobi, Mathare, Kiu, Riara, Ruiru and their tributaries. This research was conducted through field assessment by taking GPS coordinates of possible pollution points downstream of the suspected area of pollution. *In situ* physiochemical analysis of COD, TDS, EC, BOD, T ALK and TSS done and samples were taken for analysis of heavy metals and pesticides. QGIS version 2.6 with the shapefiles of Kenya water basins, Kenya major rivers and tributaries, wetlands, protected areas and forests and major towns were used in mapping of these points within the basins. There were high values of physiochemical parameters in the mid catchment, TDS of 6146, COD of 4314 and high traces of heavy metals in the mid catchment, pesticides in the upper and lower catchments. It was therefore concluded that much of the pollution in Nairobi and Mbagathi sub basin emanate from poor management and handling of waste water and from anthropogenic activities such as settlements/build up areas and Agriculture. Pollution is mainly from sewer line discharges, effluents from the Water Services Providers, solid waste disposals and industrial effluents at the middle catchment, sediments and pesticides/herbicides from farming activities within the upstream and downstream parts of the sub catchments.

Keywords: *Mapping, pollution, point, non-point, basin.*

Application of AquaCrop Model Yield Optimization for Prediction of Optimal Sowing Dates under Alternative Soil Moisture Regimes in Laikipia, Kenya.

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Abstract

This study presents the use of AquaCrop model in prediction of optimal onset dates for wheat crop grown under ASAL conditions in Laikipia County, Kenya. Modeling was done through simulation of root zone moisture content to reduce yield losses from crop failure. The optimal sowing date(s) for rain-fed wheat was based on AquaCrop rainfall criterion for generation of onset dates and optimization analysis of AquaCrop simulated grain yields. The cumulative rainfall of 10 mm in 4 successive days' onset criteria equivalent to the calculated Readily Available Water (RAW) required at 10 cm soil depth was adopted. Based on the onset criteria, a total of 57 simulations (19 years' rainfall record and three onsets: early, normal and wet) was run using AquaCrop model and frequency analysis applied to the simulated yields to get the yield levels expected at varying levels of probability of exceedance. The set threshold was incremental at 0.5 ton/ha level from 0-12 ton/ha. Probability of exceedance was zero for threshold mean yields beyond 5.5, 11.0, 11.5 ton/ha for early (SD1), normal (SD2) and late (SD3) onset respectively. At 20%, 50% and 80% probability of exceedance, the average expected yield was less than or equal to 4.5, 0.5 and 0.38 ton/ha for SD1, 4.5, 0.75 and 0.38 ton/ha for SD2 and 6.0, 0.75, and 0.38 ton/ha for SD3 respectively. Results indicated that zero tillage optimized the yield in all the sowing dates selected. In conventional tillage, early onset had high yield advantage for the viable early onset but the risk of failure was high representing 22.11%. It is recommended that sowing date, which is a technology problem, requires to be given a lot of attention.

Keywords: *Optimization analysis, staggering onset dates, frequency analysis, zero tillage, climate.*

Assessing the Pattern of Land Development in the Along the (Greater) Eastern Bypass in Nairobi Metropolitan Kinuthia, H^{1,2}, Letema, S¹, Majale, C¹.

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Abstract

Land speculation accompanies infrastructure planning and development in peri urban areas. In absence of systematic planning of land adjoining the infrastructure, the pattern of land development is defined by land owners, land speculators and developers. We examined the pattern of land development along Eastern and Greater Eastern Bypass of Nairobi before and after construction of the roads. Data on land subdivision, transfers and development of parcels for the period of 2008-2020 was analyzed at intervals of four years, where the parcels were overlaid with satellite images. Despite the increase in land subdivision and change of use from agricultural to urban use, most of the land has not been developed hence leaving it idle with minimal use. Land speculation triggers land transfer, subdivisions and sales but does not necessarily result into development of speculated land. Increased land subdivision triggered by speculation does not imply readiness for development however it foreruns leapfrog development which decreases over a period of time. Land development in areas characterized by land speculation is driven by a combination of economic, political and other undefined forces as opposed to policy.

Keywords: *Land Development, (Greater) Eastern Bypass, Nairobi Metropolitan*

Solar Powered Automated Fencing System

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Abstract

The objective of our project is to provide a solar powered automated fencing system for warding off animals from farms using a microcontroller. In rural homes, manual intervention by farmers is required to ward off the animals that intrude the fields and damage crops and lead to economic losses to the farmers. The project will therefore enhance farmer's intervention saving their resources. Over 75 percent of the rural households depend on agriculture as their principal means of livelihood. There has been much technological advancement in the agricultural sector, but warding off wild animals, which trespasses the farms, is still being done manually in rural Kenya leading to crop destructuion and economic losses to farmers. The project will automatically prevent the entry of animals into the farms. We seek to develop an inexpensive and effective farm fencing system using solar energy from solar panels to drive an electric current through the wires of the fences that wards off animals by giving them a safe electric shock, the fence is energized when the intruder is in close proximity to the fence hence saves on power loss due to environmental factors. If in some cases, small animals like rodents, rabbits and birds manage to enter the farm, then ultrasonic sensors are used to detect their presence and scare them away.

Keywords: *Automated fencing, solar energy, farm, shock, ultrasonic sensors, energized*

The Modern Traveler's Kit

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Abstract

It is evident that a lot of people have been unable to travel and self-isolate due to corona virus pandemic and the high cost of accommodation facilities. The traveler's kit is an innovation that can be used to mitigate travelers' accommodation challenges, using easily recycled, environment friendly material to create self-employment and enhance usage of local technology among others. It is a reusable descent and cost effective innovation made from fabric wastes and interfacing or sponge fabric (natural fibers). It's an alternative to common small carriage bags. It can also be used as a sleeping bag for hitch hikers. The innovation was conceived and developed in order to address eminent shortage of descent and cost effective way of addressing travelers' accommodation challenges. These include decent sleeping space for individuals and groups, storage of personal effects, and other relevant functions. During design and construction, specific consideration was given to the remnant fabrics, good waste disposal. It can also solve accommodation problems in schools and colleges. For instance, the same class can be used for learning during the day and as a dormitory during the night. Tourists can use the item to carry personal items and foodstuffs while on transit and use the same for sleeping in at night. Home based care or isolation centers for coronavirus infected patients, the kit can be suitably used for sleeping in to isolate patients.

Keywords: *Travelers' kit, innovation, flexibility, fabric, accommodation.*

Investigating Effect of IR Emitting Element to Time Constant of Solar Cell Lifetime Njoroge, D.N.

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Abstract

Solar photovoltaic (PV) system is instrumental in provision of sustainable energy in the wake of social and environmental concerns. While research in solar cell efficiency has made great strides and achieved over 40% efficiency. Key concern is however, extending time constant of solar cell lifetime in minimum or no insolation. This emanates from the fact that most of solar cells have solid power storage which runs out under limited insolation reducing reliability of the cells. Improved in PVs high efficiency with flexible and lightweight thin films, would reduce on reliability which can guarantee longest time output in limited insolation. This paper investigated the effect of an infra-red generating element on time constant of a solar cell lifetime when the element is placed adjacent to solar cell. Using a dye-sensitized (DSSC) TiO_2 solar cell electrode, maintaining topology, thermal escape mechanism, quantum structure and optical absorption of In(Ga)As quantum dots in a wide gap Al_{0.2}GaAs host material, the study investigated effect of attaching an emitting element on the solar cell lifetime whose findings showed a minimum of 27% increase in power output under low irradiation, while 14% increase in power output was recorded for high irradiation when an IR diode was mounted adjacent to solar cell. The study concluded that standardized IR element adjacent to a solar cell in a PV system significantly stretch a solar cell lifetime and power output.

Keywords: *Solar cell efficiency, time constant, IR emitting element, solar cell lifetime.*

Effect of Varying Thickness on Performance of Titanium Dioxide Solar Cell

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Abstract

The need for energy to drive economic development has increased tremendously yet most energy sources lead to environmental pollution with consequences such as global warming and serious health complications. Global warming for instance exacerbate problems of some energy source like hydro-generated energy due to climate variability. Alternative options have thus to be investigated. This study assessed the effects of varying solar cell thickness on its output. The study used a TiO_2 (the photo active layer) and the electronegative material layers on current-voltage output of the fabricated solar cell. Various ratios of titanium dioxide: graphite /iodine/KI mixtures were prepared in each respective layer. Optimization involved varying the mass of the constituents of each layer while maintaining other constants to obtain the highest current-voltage outputs. The mixtures at varying ratios were made into pellets and their electrical properties investigated. The presence of KI enabled solubility of iodine enhancing it to disperse evenly in graphite whose mass was constant at 0.01g in all the cells fabricated. The optimal thicknesses were found to be 2.00 and 1.00 mm respectively. The optimum electricity generation was observed at the ratio of $\text{TiO}_2/ \text{C}_x: \text{I}_2: \text{KI}$ as 0.4: 0.3: 0.17: 0.01g, respectively. The highest open circuit voltage (V_{oc}) of 0.979V and a short circuit current density (J_{sc}/cm^2) of $12.037\mu\text{A}$ was observed, giving efficiency (η) of 0.006% and a Fill factor (FF) of 0.64. The study concludes that thicker cells resulted to higher voltage and current output. However, this variation was dependent on the ratio of $\text{TiO}_2/ \text{C}_x: \text{I}_2: \text{KI}$. Industrial and scholarly recommendations are presented.

Keywords: *Varying thickness, performance, titanium dioxide solar cell.*

Variations of Vapour Compression Refrigeration Systems Cooling Loads with Varying Solar Insolation

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Abstract

Solar energy is readily available but intensity fluctuates with the seasons of the year in many. Due to this fluctuation, there exists a mismatch between solar energy availability and cooling load energy demands in solar technology, which make them inefficient and unreliable at certain times depending on weather and season. Sufficient harnessing and storage of solar energy for use in solar energy applications, is critical for improvement of efficiency and reliability of solar technologies. This is only possible if the solar driven refrigeration system utilizes the maximum solar energy available at a specific site, and stores some of the energy in form of ice thermal load systems. This study has analyzed three different sizes of solar vapour compression refrigeration systems, each fitted with an AC compressor. Four PV panels each of 200Wp were connected to the systems and exposed to different levels of solar insolutions for the same period of time. The maximum cooling loads from each system, was established by temperature drop of the water in the cooling can and the mass of ice formed in a jacket of cooling water for each of the systems. An innovative control unit controlled the running of the compressors, depending on the solar insolation required by each compressor. The number of hours each compressor ran per day was recorded by a datalogger. Results showed that solar refrigeration systems with AC compressors exhibited a maximum cooling load for different refrigeration system AC compressors, which is dependent on the solar insolation of a specific location.

Keywords: *Solar insolation, vapour compression, cooling load, ilce thermal system ITS*

Numerical Investigation of Thermal Elastohydrodynamic Lubrication Using the Power Law Model

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Abstract

Bearings support rotating machine elements, and reduces friction, wear and tear between moving parts. The aim of this paper is to investigate thermal elastohydrodynamic lubrication of rolling bearings where the lubricant is considered to be non-Newtonian. This lubricant is described by the power law non-Newtonian model for various flow index for pseudo plastic, Newtonian and dilatant fluids. The mathematical model is one dimensional where both the Reynold and energy equations are modified to incorporate the non-Newtonian nature of the fluid. The other equations that describe the nature of the lubricant are given by film thickness, load, viscosity and density equations. These equations are non-dimensionalized using the Hertzian dry contact variables and discretized using the finite difference approximation technique. The results demonstrate that the pressure, film thickness and temperature of the lubricant increase with increase in the flow index. However, dilatant fluids are more significantly affected by thermal effects as compared to Newtonian and pseudo plastic fluids. The results show that thermal effects have significant effects on the properties of the lubricant as compared to isothermal cases. The results also demonstrate that viscosity of the lubricant increases with increase in pressure but reduces with increase in thermal effects. The surface roughness of the bearing increases the film thickness of the lubricant and the pressure, film thickness and temperature of the lubricant increases with increase in the bearing speed. Thus, to truly reflect the characteristics of elastohydrodynamic models, thermal effects should not be neglected.

Keywords: *Elastohydrodynamic, non-newtonian, power law, thermal*

Optimizing a Trapezoidal Open Channel Fluid Flow for Steady Uniform Flow Marangu, P. K, Rukaria, S, & Kinoti, C.

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Abstract

Suitability of a trapezoidal channel with a segment base in drainage design system is being investigated. Water if not properly drained can create destruction. This is caused by poor drainage in the existing road network systems. This affects severely economic development of our country. Thus, the provision for adequate drainage is of paramount importance in road design and cannot be over emphasized. We investigated the optimum trapezoidal open channel fluid flow with a view to maximizing discharge using analytical methods to solve the equations and determine the optimum trapezoidal channel design that maximize discharge for steady uniform flow. Results showed that the maximum discharge is achieved when hydraulic radius is half the level of the free surface of the fluid from the channel bed, ($\frac{y}{2}$) and the wetted perimeter is minimum and area are maximum at the optimal discharge.

Keywords: *Discharge, top width, area, wetted perimeter, hydraulic radius, chezy's equation, optimization and open channel.*

SUB-THEME: ICT, SCIENCE AND TECHNOLOGY

Detection and Prevention of Cyber Threats Using Open-Source Applications for Startup-Fintech Firms in Kenya**Reuben, J. M¹, Obura, J²**¹*Kirinyaga University,* ²*Bomet University College, Kenya***Correspondence:** *jmwikya@kyu.ac.ke***Abstract**

Financial technology (fintech) is emerging as an innovative way to achieve financial inclusion and the broader objective of inclusive growth. With the rise in fintechs, Cybercrimes are steadily emerging, and are unpredictable with increasing in frequency and in sophistication. Cyber risks have been identified as a major challenge because of the potential systemic risks and interaction with other risks. Despite these cyber threats, start-up fintech firms are unable to implement expensive cyber security detection and prevention applications which might be overkill, both financially and functionally. This problem of cyber-attacks has led to monetary losses for financial institutions through denial of services or direct financial losses and has adversely impacted financial institutions through data privacy breaches and related reputational risks as recent high profile cyber-threats demonstrated. A possible cause of this problem is limited domain knowledge about the types of threats and capability of analysing the possibility of threats and narrow knowledge on functional and least costly tools for detection and prevention of cyber threats. We investigated types of cyber-threats and the available open source applications for detection and prevention of these cyberthreats and discuss the need for fifth generation cyber security architecture. We determined the types of cyber-threats, available open-source applications for detection and prevention, appropriate implementation areas, of prevention applications in campus networks for start-up fintech firms and future architecture for management of cyber security. Results showed that common cyberthreats to fintechs are Malware, Trojan downloaders, Botnets, Denial of Service, Phishing, Social Engineering, Crypto jacking, Web Application attacks and System Vulnerabilities threats. There are several open-source applications for detection and prevention of cyberthreats namely applications; Snort, Suricata, OSSEC, Security Onion, Vistumbler, Smoothwall Express, NG Firewall Free, ClamAV. Current security architectures are outdated and thus there is a need for implementing fifth generation architecture that includes cloud infrastructure, Internet of Things and Artificial Intelligence.

Keywords: *Cyber threats, open-source applications, startup-fintech firms, Kenya*

Security Model for Detection of Insider Security Systems Threats

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Abstract

Insiders are people with legal access to information. They pose a challenge to security of information systems. Insider information security systems threats may compromise the system security through misusing the resources they have been assigned to accomplish their roles in an institution. There are models that have been presented to help organization protect itself against insider security attacks. The models presented are categorized as predictive, intent-driven threats models and domain oriented model. There are inadequate models in literature that can be applied in organizations for insider security threats protection. The existing model further faces challenges at the implementation stage and practical implications of the model use in organization.

Keywords: *Insider threats, security model, systems security.*

Secure Savings and Credit Cooperatives' Mobile Banking Service Provision through Cyber-Security Impact Mitigation

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Abstract

The rapid development of mobile technology has resulted in the domination of mobile devices as the main channel through which people conduct most of their day-to-day communication, business and leisure activities. Several financial institutions are incorporating mobile banking and financial services as a key component of their growth strategy. However, the increasing capabilities that mobile technology offers have brought about a large number of security challenges to mobile banking. We investigated the Cyber-Security Compromises Impact Mitigation for Secure Savings and Credit Cooperative (SACCO) Mobile Banking Service Provision in Kenya. In order to achieve this, the cyber-security challenges experienced in SACCOs in Kenya were determined approaches being used to minimize their impact to mobile banking service provision by SACCOs evaluated. We further modelled a secure mobile banking service provision framework and developed an application for establishing the level of user perceived secure mobile banking in mobile banking systems in SACCOs. Mixed method research design was adopted whereby survey research design was used to collect both qualitative and quantitative data that was used to inform the second phase of the study that took on experimental format. A user perceived secure mobile banking service provision tool was developed. Stratified and purposive sampling were employed to select the SACCOs in Kisumu and Kakamega Counties. Since SACCOs in the whole republic operate under the same regulations, SACCOs from the counties selected were considered representative of SACCO operations within Kenya. Questionnaires, interviews and Rapid Application Development tools were used in the study. Questionnaires and interviews were used for data collection. Rapid Application Development (RAD) technique was used to develop an application for assessing the level of user perceived secure mobile banking service provision. Descriptive and inferential statistics were used to analyze the collected data to determine the cyber-security challenges experienced as well as evaluating the measures employed by SACCOs to ensure secure mobile banking service delivery. Thematic analysis provided additional data on trends on cyber-security to enable modeling of a cyber-security framework for secure SACCO mobile banking as well as a tool for establishing the level of secure mobile banking services provided by the mobile banking system. Triangulation of data collection methods as well as the data itself was used to enhance validity and reliability of the study. Results showed that cyber security challenges negatively affect secure mobile banking service delivery. The findings will benefit the SACCOs and its mobile banking service customers, financial institutions, Kenya government, ICT regulatory bodies and telecommunication companies in managing cybercrime for effective mobile banking services.

Keywords: *Secure savings, mobile banking, cyber-security, mitigation*

Crustacean Versus Mammalian Derived Calcium Phosphates for Water Treatment

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Abstract

Bone char (a biogenic hydroxyapatite) is the adsorbent of choice for defluoridation of water in many regions of Africa. Studies have shown that its efficiency decreases significantly as the concentration of F⁻ rise above 10 mg/L. Many researchers have thus investigated alternatives sources of calcium and formulations of calcium phosphate system for F⁻ treatment. This paper presents a study of the performance of crustacean derived adsorbents in the natural environment of fluoride polluted waters. Crab shell derived adsorbent showed outstanding selectivity for fluoride even in water with high total dissolved solutes and pH. The adsorbent also removed color in tinted waters.

Keywords: *Crustacean, mammalian, calcium phosphates, water treatment*

Determination of Moments of Binomial Mixtures Using Recursive Relations

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Abstract

Mixed distributions are important in modeling data whose distributions are heterogeneous. However, determining their moments can be cumbersome due to the fact that their constituent distributions are different. This challenge can be addressed using the recursive relations which can be constructed through integration by parts technique. The objective of this study was to construct recursive relations of Beta-binomial mixtures through integration by parts techniques and use the recursive relation obtained to determine moments of the mixtures. The outcomes will be used to obtain mean and variances of the mixed distributions. These recursive equations are useful in insurance industry where they are applied in calculation of total aggregated claims.

Keywords: *Operators, norm-attainable algebras, binomial mixtures, recursive relations*

Biometric Properties and Network Technologies as Determinants for a Secure Electronic Voting Architecture

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Abstract

Electronic voting should be uniform, confidential, secure and verifiable as eligible voters are authenticated by his/her unique characteristics and illegible voters not allowed to cast more than one vote. Voting auditors can check whether all cast ballots are used in computation of the final tally. Most of the e-voting architectures used currently to identify and verify a voter uses single biometric source mainly the fingerprint. Single biometrics source has many problems which include noisy data, intra class disparity, inter class resemblances, universality, spoofing and insecurity. Multi-biometrics sources use multiple source of information for individual authentication. One of the gaps that exist in E-voting implementation in developing countries is the lack of spread of Internet connectivity and electricity. This gap provides a foundation for the research in which an e-voting architecture will be developed based on a polling station setup involving a local area network that uses 3G and 4G technology and General Packet Radio Service (GPRS) for data transfer. This study will evaluate existing electronic voting architectures, investigate biometric technologies in real-world applications, determine existing network technologies necessary for designing e-voting architecture and finally a secure electronic voting architecture will be developed. This research will be carried out using selected counties in Kenya for election processes. The research uses qualitative and quantitative methods. Random and purposive sampling techniques will be used. Data will be collected using observation, interviews, questionnaires, and documents scrutiny. Validity of content and research instruments will be enriched by contributions of specialists, lecturers and supervisors from the department of Information technology. Descriptive statistics will be used to summarize and present data and results. Inferential statistics will be used in making inferences. Reliability of research instruments will be ensured using the split-half method. The findings of this study are significant to the counties under study and to the government in enhancing use of e-voting to improve transparency. An e-voting prototype will be developed to validate the architecture. This architecture will enable developing countries use an e-voting architecture with minimal Internet connectivity using long life batteries where electricity is not available. It will also eliminate irregularities in voter identification, vote casting, and vote counting, vote tallies and auditing.

Keywords: *Biometric, network technologies, secure electronic, voting architecture*

Properties of Operators in Norm-Attainable Algebras and their Applications

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Abstract

There are many studies in operator theory which are useful and results have been obtained on norms of normal operators particularly by Kitaneh, Dragomir among other authors. However, characterizations of normality and norm-attainability of these operators have not been exhausted. The pending question that remains interesting is: What are the necessary and sufficient conditions for normal operators to be norm-attainable? Moreover, what are the norms of normal operators if the norm-attainability condition suffices? The general objective is to determine the relationship between normal operators and norm-attainable ones in Hilbert spaces. We outline the theory of normal, self-adjoint and norm-attainable operators. The specific objectives of the study were: To determine numerical radius attainability of self adjoint operators; to establish conditions for norm-attainability of self-adjoint operators; and to investigate reflexivity of self-adjoint norm-attainable normal operators. The methodology involved the use of inner products, tensor products and some known mathematical inequalities like Cauchy-Schwarz inequality, parallelogram identity and the triangle inequality. There was a strong relationship between normal operators and norm-attainable operators' i.e. normal operators are norm-attainable if they are self-adjoint. These results concur with the results of Dragomir which verify normality for compact operators when the Hilbert space is taken to be infinite dimensional. These results are useful in quantum theory in generating quantum bit and estimation of ground state energies of various molecules like ethane and can be used to demonstrate how national cohesion and integration can be achieved.

Keywords: *Hilbert space, normality, norm-attainability*

Artificial Neural Networks and Fuzzy Logic for Software Maintenance Cost Estimation: A Comparative Review Study

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Abstract

Maintenance is the last stage of software development life cycle. A software cost estimation model is an indirect measure, which is used to estimate the cost of a project. Maintenance cost is directly determined by the number of people involved in the maintenance process and hours each person invests in the maintenance tasks.

Artificial Neural Network is used in cost estimation due to its ability to learn from previous data. In a fuzzy logic tool, values are given as input and output is calculated by using a set of rules defined in rule base and fuzzy operators. This research aims to analyze neural networks and fuzzy logic machine learning techniques for estimating software maintenance cost between the period 2010- 2020 and compare the techniques based on magnitude of relative error (MRE), Mean magnitude of relative error (MMRE) and percentage relative error deviation within x PRED(x) accuracy estimators. Millions of companies expend huge financial resources for development and maintenance of software yet still many projects result in failure causing heavy financial losses. Major reason is the inefficient effort estimation techniques which are not suitable for the current development methods. This paper presents a comparative literature review on software cost estimation for neural networks and fuzzy logic techniques. The evaluation consists of comparing the accuracy of the estimated effort with the actual effort based on Magnitude of Relative Error (MRE), Mean Magnitude of Relative Error (MMRE and PRED(x)). The findings show artificial neural networks provide efficient results when dealing with problems of complex relationship between inputs and outputs. Fuzzy logic-based cost estimation models are more appropriate when vague and imprecise information is to be accounted for. Neither neural networks nor fuzzy logic techniques should be used in isolation but rather a combination of the two technique should be used to arrive at accurate cost estimate.

Keywords: *Software cost estimation, fuzzy logic, neural networks.*

Social Utility of Mobile Phone Technology by Undergraduate University Students in Nairobi, Kenya

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Abstract

Mobile phone has entrenched itself in the modern world as an equipment that can be used for many functions besides communication. In Kenya, technological innovation spearheaded by Safaricom's *M-Pesa* brand has given the mobile phone a new meaning where the mobile phone numbers are used as banks with the mobile phone number acting as the bank account number. This study investigated social utility as a gratification factor influencing mobile phone technology use by public university undergraduate students in Nairobi, Kenya. The study employed the media technological determinism theory. The target population was 246,871 undergraduate university students in public universities in Nairobi, Kenya. The design used was quantitative. Self-administered questionnaires were used as data collection tools. This study utilized purposive sampling to arrive at a sample size of 573 undergraduate students. Data was analyzed using descriptive statistics and processed using the Statistical Package for Social Sciences (SPSS) version 22. Results showed that mobile phone technology has become essential in social utility activities among undergraduate university students. The research concluded that the more the need for social utility, the more the need for mobile phone technology use among undergraduate university students. There is need for software developers to develop a specific mobile phone software for university students to use for social utility.

Keywords: *Social utility, mobile phone technology, undergraduate, Kenya.*

A Framework for Curriculum Design and Development Using Blockchain Technology

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Abstract

Curriculum design and development process combines educational design and other activities including: Management of Information, Market research, Quality enhancement, Quality Assurance and Programme Approval. The process involves stakeholders such as Students, Employers, Professional Bodies, Student Alumni and Accreditation Bodies. The stakeholders need to have meaningful engagement throughout the process. The existing Curriculum Design and Development process can be improved by use of Blockchain Technology for greater transparency, enhanced security and easier traceability. Blockchain is a distributed ledger technology that records exchanges of value between parties securely, permanently and in a verifiable manner. The goal of this study is to design a framework for curriculum design and development using Blockchain Technology. A design framework is created and validated to solve the problems of traditional centralized curriculum design and development.

Keywords: *Framework, curriculum design, development, blockchain technology*

Digital Learning in the Context of Covid-19 Crisis: Leveraging on “Big Data” Analytics

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Abstract

The Covid-19 pandemic has caused unprecedented disruptions in the higher learning institutions not only in Kenya but globally. The diagnosis of the first case in Kenya in March, 2020 marked the beginning of a prolonged closure of learning institutions. Consequently, stakeholders had to rethink their learning strategies and come up with innovative approaches to not only adapt to the changes but also survive the disruption. Hence, the genesis of implementation of the digital learning programme at Institutions of higher learning including Kirinyaga University (KyU). Despite the unique opportunity presented, majority of institutions were ill-prepared to implement the capital and resource-intensive digital learning programme. In addition, this crisis was happening in the middle of government implementation of a Competence-based Curriculum (CBC) programme. As a result, the implementation of digital learning has not been without its fair share of challenges. Significantly, it has been almost 1 year of implementing the digital learning, hence the question should be, are there are lessons learnt so far? Similarly, harnessing of the power of ‘Big Data’ analytics using the massive data generated for new insights might be used to inform evidence-based decision making. In a statistical and computer modeling design pilot study, feasibility of this phenomenon was tested. According to the study findings, the total number of attempted questions, time taken to finish the examination and gender were predictive of the overall performance score. Consequently, “Big Data” and Learning analytics of the generated reports can be used to identify not only system but also individual learner’s-specific challenges. This might provide useful insights for not only optimizing the system but also, in the context of Covid-19 crisis, to provide evidence-based and data-driven advice to stakeholders, for effective policy interventions during as well as after the crisis. In addition to supporting the successful implementation of CBC programme, this will have a direct impact on education system, hence helping the government of Kenya (GoK) in attainment of the United Nations (UNs) sustainable development goal (SDG) number 4 on ensuring inclusive and equitable quality education as well as promoting lifelong learning for all. Overall, it will assist in the achievement of the national government’s economic blueprint of Vision 2030 that aims at building a knowledge based economy.

Keywords: *Digital learning, big data analytics, learning analytics, customized/individualized learning*

A Deep Normalized Neural Network Model for Strawberry Fungal Leaf Disease Detection

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Abstract

Agriculture is the backbone of the Kenyan economy as it accounts for 80% of the country's economic output. Strawberry is one of the crops that are being grown in Kenya and other areas in Africa. However, strawberry plant fungal leaf diseases are threatening survival of this crop which is an important agricultural crop. The types of strawberry leaf diseases resulting to greater losses in production include Strawberry Leaf scorch, Strawberry Leaf Spot and Strawberry Leaf Blight. The biggest challenge the farmers face is that of correctly classifying the strawberry plant leaf diseases based on leaf characteristics. This has led to misdiagnosis and poor or incorrect treatment hence losses. This scenario is more pronounced in rural settings where farmers have limited access to expertise in modern agricultural production. As a result, automated classification of strawberry plant fungal leaf diseases is highly desired. Computer vision techniques have been leveraged in plant disease detection. Among these solutions are the convolutional neural network based models. Despite the high detection accuracy, the models do not cover several classes of strawberry fungal leaf diseases such as leaf spot and fail to generalize well on unseen data. The models also do not consider cases where more than one disease occur on the same part of the plant, in this case the leaf. In this study, a model based on deep learning was proposed for classifying fungal leaf diseases in strawberry plants. Data samples containing a total of 3,880 leaf images, categorized into five classes including healthy leaf images were used to train and validate the model. The disease classes include strawberry leaf spot, leaf scorch, leaf blight and a class where two diseases (Leaf Blight and leaf Scorch) occur together. The model was trained on 30 epochs from scratch with batch normalization implemented within the convolutions in Keras framework and achieved a classification accuracy of 94.97%.

Keywords: *Batch normalization (BN), Convolutional neural networks (CNNs), data augmentation (DA), deep learning, Image classification, strawberry leaf diseases.*

Assessment of Digital Library Services in Poverty Alleviation among Youths

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Abstract

Digital libraries are information hubs that help in provision of information that can be synthesized by youths for eradication of poverty. Youth form 80% of the Kenyan population. The multiplicity of poverty such as chronic lifecycle and Inter-generational poverty experienced by youths can be mitigated through provision of appropriate information to improve their livelihood. This study aims at establishing the relationship between provision of information and reduction of poverty level, amongst the youth. The study objectives are: to identify digital library services; to assess utilization of digital information services and to establish information strategies to mitigate poverty. The study employed a quantitative research method using a descriptive survey approach. Kenya National Library was purposively selected for the study. The target population for the study was 500 youths, with a sample size of 200 respondents. Data collection was done through online questionnaires and analysed using descriptive statistics. The study established that information provided through digital libraries services helped the youth overcome poverty. The findings of the study will help policy makers to understand the importance of digital libraries in eradicating poverty. The Kenyan population will have a better understanding of how information transforms lives of youths. The study therefore recommends continuous dissemination of information to mitigate poverty in Kenya.

Keywords: *Digital library, digital services, information, poverty alleviation, youth, empowerment.*

Spectral Boundedness of Compact Elementary Operators

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Abstract

Numerous properties of elementary operators have been studied by various researchers over decades, for example; Fredholmness, compactness and spectral properties, among others. Also, the spectral boundedness of compact elementary operators has been an active area of research in operator theory. So far, it is not clear the necessary and sufficient conditions for elementary operators of arbitrary length to be spectrally isometric. Moreover, conditions for a basic elementary operator to be spectrally bounded still remains an open question particularly on dense irreducible subalgebras. The objective of the study is to characterize spectral boundedness of compact elementary operators. The methodology involved Jacobson density theorem, Sinclair's theorem, sub-harmonicities of spectral radius and Liouville's theorem among other fundamental results. The results of the study showed that left multiplication, right multiplication and generalized derivation are spectrally bounded on dense irreducible C^* -subalgebra. The study may be useful in local spectral theory especially in self-adjoint operators that play a crucial role in the study of automatic continuity theory.

Keywords: Spectral boundedness, centre, elementary operators.

Automorphisms of Zero Divisor Graphs of Galois Rings**Mude, H. L.¹, Oduor, O. M.², Onyango, O. M.³**¹University of Kabianga, ²Masinde Muliro University of Science and Technology, Kenya**Correspondence:** hlao@kabianga.ac.ke**Abstract**

Let R be a commutative finite ring with unity and let $Z(R)$ be its set of zero divisors. The study of R in which the subset of zero divisors forms a unique maximal ideal has been extensively done yielding interesting and useful results. For different classes of R , the invertible element have been characterized by use of fundamental theorem of finitely generated abelian groups while $Z(R)$ has been characterized by the zero divisor graphs. Scanty in the literature are the maps that preserve the structures of R and its subsets. In view of the aforementioned, this study shall determine and characterize the automorphisms of zero divisor graphs Galois ring. The methods shall involve partitioning the ring under consideration into mutually disjoint subsets of invertible elements and zero divisors, isolation of the zero divisors and determination of their graphs using case to case basis discovery of the maps that preserve the structures of this graphs using mathematical inductive reasoning. This study will prove its significance by extending the existing results on R ; thereby providing a much better understanding of the ring towards its classification.

Keywords: *Automorphisms , zero divisor graphs, galois rings*

On the Evaluation of Financial Risk using Conditional Value at Risk (CVaR)

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Abstract

During review of the trading book in the year 2013, the Basel Committee on Banking and Supervision proposed movement from 99% Value at Risk to 97.5% Expected Shortfall with a horizon of one day in quantifying market risk for banks. However, the accord allowed financial institutions to use internal models in forecasting their risk levels. In this regard, most risk managers prefer Value at Risk due to its simplicity and intuitive interpretation. This is despite the many shortcomings of Value at Risk evidenced in literature. This study looks at estimation of Conditional Value at Risk using conditional extreme quantile autoregression and how the resulting estimator is applied in evaluating financial risk in banks and other financial institutions. Performance of the estimator is compared against two other values at risk estimators using Root Mean Squared Error. Results from the study indicate that the proposed Conditional Value at Risk estimator is consistent and leads to more accurate risk estimates.

Keywords: *Evaluation, financial risk, conditional value at risk (CVaR)*

SUB-THEME: AGRICULTURE, ENVIRONMENT AND WATER FOR SOCIETAL EMPOWERMENT

Water - Energy - Food Nexus in Kenya: Climate Change Impacts and Adaptation Strategies

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Abstract

Water - energy - food (WEF) nexus is a novel concept which aims at integrating three key drivers of economic development and improvement of livelihoods. Management of these three resources requires careful assessment of synergies, conflicts and trade-offs which are inherent in the nexus: water for food and food for water, energy for water and water for energy, and energy for food and food for energy. Attainment of sustainable development goals in Kenya is centred towards the management of these resources. Kenya is a water scarce country and therefore water availability to drive the energy and food sectors is critical. After the 1997-1998 El Nino rains menace in Kenya, recurrence heavy precipitation and drought have simultaneously affected WEF nexus. Climate variability and change bring uncertainty to water, energy and food situations in the Country. Over 75% of the agriculture in Kenya is rainfed and thus risky in the face of poor temporal and spatial distribution of rainfall. Over-reliance on rainfed agriculture threatens food security in the country and thus the need for full or supplemental irrigation for yield stability and enhancement of agricultural production. Energy sector is a key enabler of water and food security. Energy reliability is low in Kenya due to reliance on hydropower sources which are prone to climate risks. This review highlights importance of WEF nexus in the face of climate change impacts. Climate adaptation mechanisms for building resilience in cropping systems, water service and energy provision are key elements for improvement of livelihoods among communities in Kenya. It is therefore imperative to address sustainably and holistically the three key sectors through policy, legal and institutional frameworks and initiatives. Sectoral co-ordination is required in the development of WEF indicators and targets. It is recommended that assessment models and tools be developed to monitor the attainment of targets under WEF.

Keywords: *Climate resilience, energy security, food security, livelihoods, water security*

Evaluation of Seed Quality of Jute Mallow (*Corchorus Olitorius*)

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Abstract

The production of high quality seeds helps to increase crop yields. Currently, there are no high quality seeds of Jute mallow (*Corchorus olitorius*) from breeders to farmers, resulting in farmers using re-cycled planting seed of crop whose quality/potential is not assured. This has resulted in low yields due to many reasons, one of them being poor quality seeds. Yields of crop has remained low 2-4 tons/ha/annum compared to expected yield of 5-8 tons/ha/annum. Farmers use up to 7kg/ha seed instead of 5kg/ha, indicating over use of 40% extra seeds. Though Kenya Agriculture and Livestock Research Organization (KALRO) is focusing her efforts on generation of appropriate strains of the vegetable, little is being done to examine seed being re-cycled by farmers for its quality, necessitating the objective to examine seed quality of Jute mallow accessions used by farmers at planting. A field survey was conducted using a structured questionnaire in five Counties of Keiyo, Uasin Gishu, Nandi, Trans Nzoia, and West Pokot and Simlaw Seed Company. A sample size of 500 farmers were visited and interviewed by use of stratified random sampling method and seed simultaneously collected. Seed quality tests and data analysis on analytical purity, germination and seed vigor was done using ISTA (2004) procedures. Results showed high seed analytical purity of 99% from both Simlaw seeds and Uasin Gishu and declared being of superior quality as per ISTA (2004) minimum requirement of above 98%. The lowest purity was from West Pokot (95%) with impurities of 3% (other seeds) and 2% inert mater. Germination results showed Simlaw Seed (89%) was highest, while Nandi (37%) was lowest. The Germination from three counties of Keiyo (57%), West Pokot (49%) and Nandi (37%) does not meet minimum standard of 60% prescribed by ISTA (2004). The highest dead seed was from Nandi (56%) and lowest was from Simlaw Seed (9%). Electrical conductivity (E.C) results showed low readings (below 10 $\mu\text{Scm}^{-1}\text{g}^{-1}$) indicating seeds were of high vigor. The highest seed vigor was from Simlaw seed (2.3 $\mu\text{Scm}^{-1}\text{g}^{-1}$) and lowest from Nandi (8.2 $\mu\text{Scm}^{-1}\text{g}^{-1}$). It was concluded that seed grown by farmers were of poor physiological quality and recommended they be trained on quality seed production to improve seed quality.

Keywords: *Indigenous, vegetable, quality Seed.*

Kenya's Green Revolution to Enhance Food Security

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Abstract

Genetic modification (GM), is the process by which an organism's genome is deliberately modified by altering a specific segment of DNA that contains genes of interest, with the aim of introducing a new trait or suppressing undesirable ones. African governments consider the potential benefits of crops in order to increase yields, decrease reliance on costly inputs, reduce labor, and provide resistance against specific diseases and pests. In Kenya, there is a ban on GM commercialisation which is hampering GM research since scientists who are ready to take GM crops beyond confined field trials to commercialisation cannot do so. This study seeks to shed light on the Kenyan context in the last five years where there have been concerns regarding the health and environmental effects of GM crops. We found that the three governmental regulatory bodies that are in charge of regulating and approving GM crops need to respect each other's authority. Also politicians need to be provided with accurate scientific information so that any statements they make are based on facts. Clear scientific information around GM crops is important to enable crucial decisions that impact the country's food security and prevent decisions being made in an adhoc manner.

Keywords: *Genetic modification, health, environmental, Kenya, GM crops*

Reduced Egg Hatch and Increased Mortality of Potato Cyst Nematode (*Globodera Rostochiensis*) Juveniles after Treatment with Different Plant Extracts under *in Vitro* Conditions

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Abstract

The potential of plant extracts in the management of plant parasitic nematodes is yet to be fully exploited as an alternative to synthetic nematicides that have negative effects on non-target species and the environment. *In-vitro* assays were carried out to determine the effect of plant extracts on egg viability and second stage juvenile (J2) mortality of potato cyst nematodes. Extracts from Mexican marigold (*Tagetes minuta*), Mexican sunflower (*Tithonia diversifolia*), garlic (*Allium sativum*), Blue gum (*Eucalyptus gunnii*) (leaves and bark), spring onion (*Allium fistulosum*) leaves, onion bulb (*Allium cepa*), ginger (*Zingiber officinale*), green tea leaves (*Camellia sinensis*) and sodom apple (*Solanum incanum*) were tested. Neem (*Azadirachta indica*) extract was used as the standard whereas water and potato root diffusate were included as negative controls. The solvents used in extraction of phytochemicals were methanol, ethyl acetate, hexane and water. Potato cyst nematode eggs and J2s were exposed to the various plant extracts for 24, 48 and 72 hrs. The treatments were arranged in a completely randomized design with three replications. Eggs treated with plant extracts had a significantly lower viability while mortality of J2s was significantly higher compared to those treated with water and potato root diffusate. Loss of egg viability and mortality of J2s significantly increased with increase in time of exposure to the extracts. For instance, the average number of non-viable eggs was 133.8 and 163.7/cyst after exposure to garlic for 48 and 72 hrs respectively, compared to 116.7 non-viable eggs/cyst, at 24 hrs of exposure. Hexane extracts of Mexican sunflower, ginger and garlic significantly induced a higher loss of egg viability/cyst of 216.9, 187.6 and 148.4 respectively in experiment 1 and 187.7, 176.7 and 165.4 non-viable eggs/cyst respectively in experiment 2, compared to extracts obtained from the other solvents. After 72 hrs of exposure of J2s to the hexane extracts of Mexican sunflower, ginger and garlic, mortalities of up to 72.6, 73.0, and 68.8% were achieved, respectively. This study has demonstrated that plant extracts from Mexican sunflower, ginger and garlic were effective in inducing loss of egg viability and causing mortality of J2s of potato cyst nematodes.

Keywords: *Azadirachtin, ethyl acetate, exposure time, hexane, methanol, phytochemicals*

Effects of Exotic Tree's Litter Quality on Responses of the Adjacent Native Grasses

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Abstract

Tree litter falls is a major pathway of enhancing nutrients cycling to the understory grass vegetations adjacent to it. The main objective of the study was to evaluate the effects of exotic tree's litter quality on the responses of the adjacent native grass. A composite sample of freshly fallen leaves was collected. Leaf samples were homogenously mixed and put in nylon litter bags of 2mm mesh size and 25g weight. Each 7 marked points (1, 10, 20, 30, 40, 50 and 60m) had 3 samples litter bag weighing 25g. A total of 84 litter bags were collected from the adjacent pastures which include 21 litter bags from Eucalyptus, 21 litter bags from Acacia, 21 litter bags from Cypress and 21 samples litter bags from the control. They were taken to the laboratory for litter analysis and later reburied back to the points where they were collected. They were first retrieved from the points they were buried at the end of dry season and later at the end of wet season. Data was summarized using excel package and then analyzed using Statistical Package for Social Sciences (SPSS) for window version 22. All the hypotheses was tested at $\alpha=0.05$. The results of the study show that tree litter quality influences resource supply to the adjacent grass pastures. The findings is thought to provide valuable information to National Environmental Management Authority (NEMA), community leaders, Kenya Forestry Services (KFS), opinion leaders, extension officers, farmers and NGOs.

Keywords: *Litter quality, decomposition rates, grass biomass*

Use of Eco-Concrete Blocks in the Building Industry for Environmental Sustainability
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Abstract

Sustainability of eco concrete blocks industries is imperative to the well-being of our planet and to human development. However, production of conventional cement, an essential constituent of eco concrete blocks leads to release of a significant amount of carbon dioxide and other greenhouse gases. Conventional cement is not an environmentally friendly material due to the fact that its manufacture creates greenhouse gas emissions and leads to reduced supply of good-quality limestone and clay. The most energy-intensive stage of conventional cement production is during clinker production. It accounts for all but about 10% of the energy use and nearly all of the greenhouse gases produced by cement production. A good way to achieve sustainable development and a balance between socio-economic as well as environmental concerns in promoting green building and construction projects considered an important part of environmental sustainability. The objective of this study research objective was to explain the significance of eco-concrete blocks in the building industry for environmental sustainability. A descriptive approach was used through literature review of primary data from relevant documents published by individual researchers and the National Construction Authority. Organizations are working to produce better eco-friendly green building products such as eco-concrete blocks and developing new ways of reuse and recycling products. Eco-concrete blocks are highly recommended for their durability, resource efficiency and to minimize wastage.

Keywords : *Cement, construction, reuse, recycling, environment.*

**SUB-THEME: ENTREPRENEURSHIP AND STRATEGIC BUSINESS
MANAGEMENT FOR SUSTAINABLE DEVELOPMENT**

Working Capital Management and Financial Distress of Non-Financial Companies

Listed in Nairobi Securities Exchange

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Abstract

Financial distress is a common global phenomenon among the corporate entities. Locally, there is overwhelming evidence of firms that have undertaken financial restructuring, delisted from the exchange market, gone into receivership and subsequently liquidated on account of financial distress. This unfavorable situation not only contributes to loss of investor's wealth but also erodes their confidence in the stock market. Available literature associates financial distress with corporate capital structure; which result from the long-term financing activities. However, capital structure decisions are notably few and far between within a corporation's operating cycle. This is in stark contrast to working capital decisions that are made on a daily basis. In the light of this factor, it is probable that suboptimal working capital decisions could trigger corporate financial distress. This study therefore set out to examine the way in which administration of working capital affects financial distress of non-financial firms listed at the Nairobi Securities exchange. Unlike the previous studies that have largely examined the effect of long-term financing on financial distress, this study set out to determine how short-term financing affects financial distress among non-financial firms. Further, this study aimed at linking working capital management decisions to financial distress; unlike preceding studies that generally focused on corporate profitability. In fulfilling this objective, the study sought to establish the effects of: Cash management, inventory management, accounts receivables management and accounts payable management on financial distress of non-financial firms listed at Nairobi Securities Exchange. The free cash flows theory, Precautionary motive theory, financing advantage theory and liquidity theory formed the theoretical foundation of the study. The study adopted longitudinal research design; which involved collecting data on the relevant variables from a census of the 40 listed non-financial companies for 10-year period covering 2009 - 2018 (both years inclusive). The study relied on secondary panel-form data obtained from audited financial statements of the non-financial firms over the listing duration. Descriptive statistical analysis was used to obtain the initial overview of the data collected. Panel regression analysis was undertaken using the F and t-tests at 95% confidence level. Results showed that liquidity level had a positive and significant effect on the firms' distress index that inventory holding period was negatively and significantly related to the firms' financial distress index and that suppliers' payment period had a positive and significant effect on financial distress indicator. There was a negative but insignificant relationship between receivables period and financial distress. We recommend that management of non-financial listed firms should ensure appropriate management of working capital components in order to mitigate their effects on financial distress.

Keywords: *Working capital, management, financial distress, on-financial companies, Nairobi securities exchange*

**Management Support and Strategies Integration in County Governments in Kenya:
A Case of County Government of Kirinyaga.**
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Abstract

County Governments are mandated to design development plans which are incorporated in the five-year strategic plans called County Integrated Development Plans. However, many of these programmes are rarely integrated into the County Government structure and systems. The main objective of the study was to establish the influence of management support on strategy integration in County Governments in Kenya. The specific objectives were to establish the influence of strategic leadership, resource allocation, capacity building and employee involvement on strategies integration in county governments in the County Government of Kirinyaga. Descriptive survey design was adopted. The target population was 277 employees. The sample size was 164 respondents. Primary data was collected using questionnaires while secondary data was gathered through a review of documents, published journals and articles. Data analysis was done using descriptive statistics, correlation and regression analysis. There was a strong positive relationship between management support and strategies integration in the county government as indicated by the coefficient ($r = 0.872$). The coefficient of determination ($r^2 = 0.76$) revealed that 76% of the variation in strategy integration could be explained by management support. It was concluded that the level of strategy integration in the county government is highly dependent on the level of management support. Based on the research findings, we recommend that county leadership should be focused on implementing the strategic goals as outlined in the county integrated development plans without political disruptions. To meet the goals enlisted in the county development plan, it is recommended that the county governments in Kenya should invest on capacity building to enhance the efficiency of their human resources, endeavor to adopt efficient strategic leadership and increase employee involvement in the planning and execution of the county development plan.

Keywords: *Management support, strategies integration, County Government of Kirinyaga, Kenya.*

Diaspora Remittance Economic Growth and Development Nexus in Kenya

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Abstract

In the recent past, diaspora remittance has been a main and regular source of foreign currency in Kenya. Over the past decade, diaspora remittance has grown from 576 Million Dollars in 2010 to 2.218 Billion Dollars in 2020 representing an increase of approximately 384 per cent. This leads to a developing interest on the impact that diaspora remittance has on economic growth considering the recent data. This study aimed to establish the effect of diaspora remittance on economic growth and development in Kenya and utilized quarterly data that was extracted from Statistical Abstracts and Economic Surveys for the period 2000-2020. The study used ordinary least squares estimation to established the effect of diaspora remittance on economic growth and development in Kenya. The outcome of the study revealed that diaspora remittance had a positive and significant impact on economic growth and development in Kenya. This study therefore recommends that the government should put policies that encourage diaspora remittance which will consequently contribute to economic growth.

Keywords: *Diaspora remittance, economic growth, economic development*

Green Entrepreneurship as a Panacea for Financial Sustainability of Businesses in Kenya during the Covid 19 Era

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Abstract

Financial Sustainability of Businesses in Kenya during the Covid 19 Era has increasingly become an agenda in today's businesses and entrepreneurship debate. In the financial sector, sustainability is necessary due to the critical role played by the sector in national development. In Kenya, financial institutions are financing investments in the various sectors of the economy. These investments have significant impacts in creating the need for adoption of sustainable finance. In spite of this, Covid-19 has led to losses with millions of shillings and impact is still damaging the financial sustainability of many businesses in Kenya. This study therefore, attempts to examine the role of creative green entrepreneurship, green washing and institutional structure on the financial sustainability of Businesses during the Covid 19 Era. It further deepens the understanding that green entrepreneurship among businesses is a critical asset for sustainability through creative, green washing and institutional green entrepreneurship. Explanatory study was used targeting 6,423 businesses in Kenya with a sample size of 376. The findings of the research revealed that creative green entrepreneurship at ($\beta = 0.10, p < 0.05$), green washing at ($\beta = 0.158, p < 0.05$) and institutional Structure at ($\beta = 0.128, p < 0.05$) all had a positive and significant effect on the financial sustainability of Businesses. It's concluded that the three constructs further enhance the financial sustainability of Businesses in Kenya during covid 19 era as confirmed by the study findings and that much needs to be done to enhance its sustainability awareness to improve the impact and return on investment of today's businesses during Covid 19 era.

Keywords: *Green entrepreneurship, Panacea, Financial Sustainability, Businesses and Covid 19 Era*

Effects of Corporate Income Tax Incentives on Financial Performance of Manufacturing Firms in Kenya

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Abstract

Tax incentives have been an issue of great concern world over as many governments have applied the incentives to attract multinational companies as well as to promote the domestic manufacturing industries. Manufacturing sector in Kenya has continued to show significant drop in its contribution to the Gross Domestic Product for the last 15 years and hence the government introduced tax incentives as one of the measures to address the challenges of the growth of the sector. The purpose of the study was to determine the effect of corporate income tax incentives on financial performance of manufacturing firms in Kenya registered by Kenya association of manufacturers. The study was based on tax discriminatory theory. Descriptive research design was adopted where a sample of 211 respondents was selected from a target population of 447 manufacturing firms using stratified random sampling technique. The response rate on the questionnaires issued was 73.5%. The collected data was edited and analysed with the help of SPSS version 25. Results showed that corporate income tax incentives had statistically significant influence on financial performance of manufacturing companies, and that tax administration procedures had a high moderating effect on the relationship between corporate income tax incentives and financial performance of manufacturing companies in Kenya. It is recommended that the government of Kenya should consider offering more tax incentives to the manufacturing companies in Kenya. In particular, it can consider reviewing the tax policy with intent to offer tax holidays to more manufacturing companies. Further research should target effects of tax incentives on financial performance of specific sectors like building and construction to test the hypothesis on specific sectors in the post COVID-19.

Keywords: *Corporate Income, tax incentives, financial performance, manufacturing firms, Kenya*

Sustaining Global Economies in the Midst of Calamities: A Case of Retirement and Retired Security in Kenya
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Abstract

Working life creates economic empowerment to the employed and those engaged in active self-employment. This paper using the Dialogues at the economic and social council of Achieving Sustainable Development and promoting development cooperation of United Nations of 2008 by various renown authors, which highlighted challenging issues especially to retirees in Kenya. The major issues that this paper is looking into are abstracts from the main point raised that include; The fragile state of the major developed market economies, threatening to undermine efforts towards the development goals, rising food and energy prices are hitting hard on the livelihoods of poor and vulnerable people calling for a workable solutions to the twin crises in the food and energy markets, the prevailing threat of climate change and the deterioration of our natural environment issues likely to have a far reaching impact to the generation after the retirees lives and globalization impact on the vulnerable and poorest communities creating a scene of insecurity to the retirees, being highly based on issues raised by Mr. Ban Ki-Moon, the secretary General United Nations in the paper, 'overcoming global obstacles to achieve development goals. The paper will look at these issues under the objectives; Legal (laws and retirement plan), Risks threats, Retirement security, Age challenges, Outliving retirement money and Watch dog challenge (rba/nssf). The problem being looked being that, 'Retirement money is not enough for most retirees in Kenya.' The paper will use a desk study. The results anticipated include; rescue for retiree predicament in Kenya, providing the conclusion that, there will a call for concerted action to address several crises, and policy implementation.

Keywords: *Global Economies, Calamities, Retirement, Kenya*

Moderating Effect of Inflation on the Relationship between Collateral and Credit Rationing among Registered Small and Medium Enterprises in Kiambu County, Kenya

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Abstract

Access to finance and terms attached to it are impacted by macroeconomics factors beyond the control of the SMEs, particularly inflation. Credit rationing mostly prevails in the periods of poor economic performance, which is fundamentally marked by high rates of inflation. There is sufficient evidence from the theory, that inflation derives down the rate of return on collaterals as well as lendable money and this in general increases credit market friction leading to credit rationing. Empirical evidence on inflation, collateral and credit rationing, documents variation in methodological aspects as well as conceptual outlook. These empirical and methodological gaps form a motivation for the current study. Hence, the study sought to establish the moderating effect of inflation on the relationship between collateral and credit rationing among registered small and medium enterprises in Kiambu county, Kenya. The study adopted positivism philosophy and utilized explanatory study design. The target population was 41,115 registered, active SMEs in Kiambu-County, out of which, a sample size of 397 was purposely selected. Using logit analysis, the study found that inflation has a statistical significance moderating effect on likelihood of SME being credit rationed as indicated by value of Wald statistic = 0.957 with p-value of 0.328 at 5 percent significance level. In view of the findings, it is recommended that the government of Kenya should maintain inflation rate as per Vision 2030 projections at one-digit figure.

Keywords: *Collateral, credit rationing, inflation, logit model, moderating effect and small and medium enterprises.*

Venture Capital Risk Measures and Access to Venture Capital Financing by SMEs in Nairobi County, Kenya

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Abstract

Small and medium Enterprises are vital for economic growth especially in the developing countries. However, empirical evidence shows that most of these enterprises fail due to poor/lack of access to finance. Access to venture capital by the small and medium enterprises could be a plausible alternative but unfortunately research has pointed out that majority of the enterprises do not access venture capital financing, which is considered an important option for small and medium enterprises trying to grow. This study sought to investigate the effect of venture capital risk measures on access to venture capital by small and medium enterprises in Nairobi, Kenya. The study was guided by the following specific objectives; To determine the effect of syndicate of investment on access to venture capital and to establish the effect of staging of capital infusion on access to venture capital. Agency theory underpinned the study. The study adopted the explanatory non-experimental research design and positivism philosophy guided the study. Target population of the study was 334 Small and medium size enterprises ranked by KPMG between 2008 and 2017 in their annual survey. Proportionate random sampling technique was used to select the firms. Primary data was collected by use of semi structured questionnaire, using drop and pick method. Both descriptive statistics and inferential statistics were used to analyze the data. Nested multinomial logit model was used to establish the effect of venture capital risk measures on access to venture capital financing. Results showed that venture capital risk measures, had positive influence and was statistically significant to access to venture capital financing among SMEs.

Keywords: *Venture capital, risk measures, access financing, smes, Nairobi county, Kenya.*

Influence of Knowledge Mapping on Employee Performance in Public Universities in Kenya

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Abstract

Universities as 'knowledge intensive' organizations thrive on production and dissemination of knowledge which calls for its professional management. The ability to gather information, generate new knowledge, disseminate and apply this knowledge to improve and innovate is an organization's knowledge productivity. The information gathering abilities benefits from knowledge mapping. Knowledge mapping is about making the knowledge that is available within an organization transparent; it is about knowledge creators and value adders whose major contributions come from their abilities to process and apply knowledge and information to completing tasks, making decisions, and solving problems. Generally, employees look for knowledge from three sources: other employees, documents of various types, and information systems (including the internet). The distributed nature of organizational knowledge makes it very hard to get a clear, complete overview, and to draw conclusions. Review of literature indicates that not too many papers have been written on how to actually build a knowledge-mapping tool and, most importantly, on how to embed this tool in organizations. This paper sought to contribute to this growing body of knowledge by studying how knowledge mapping can be applied and its impact on employee performance in public universities in Kenya. Through descriptive research design, the study examined the influence of knowledge mapping on employee performance in public universities in Kenya. Simple regression analysis revealed positive and significant influence of knowledge mapping on employee performance in public universities in Kenya. Descriptive survey design was applied and descriptive and inferential statistics used to analyze the data. The target population consisted of 495 employees from 10 public universities in Kenya selected on the basis of their size and age. There was a significant and positive relationship between knowledge mapping and employee performance in public universities in Kenya.

Keywords: *Knowledge, knowledge management, knowledge mapping, employee performance*

Strategic Responses and Sustainable Competitive Advantage of Milk Processing Firms in Kenya

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Abstract

Strategic responses have become a common phenomenon in recent times throughout the world. Organizations have adopted strategic responses locally as well as internationally due to the increased competition in the global market that has prompted them to adopt strategic responses as an important strategic choice. These strategic choices are the strategic options in the hands of many organizations not only to stay in the competition but also to extend their margins, market share and dominance globally. This study sought to investigate the effects strategic choices have on sustainable competitive advantage of milk processing firms in Kenya. The specific objective of the study was to determine the influence of restructuring strategies on sustainable competitive advantage of milk processing firms. The study employed a descriptive research design on a target population of 240 employees of beverage firms in Kenya. A sample size of 96 respondents was selected for the study. The study used mean, standard deviation, frequency and percentages in the analysis. Multiple regression analysis was used to estimate the changes in the dependent variable following a unit change in each of the independent variables. The study found out that firms had invested a lot in restructuring to eliminate non-core business activities, consolidate their business functions and re-organized their business processes so as to gain competitiveness. The study concluded that restructuring strategies contributed immensely to sustainable competitive advantage of milk processing firms in Kenya.

Keywords: *Restructuring, sustainable competitive advantage, strategic choice, strategic responses*

Entrepreneurship and Sustainable Economic Development

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Abstract

Globally, entrepreneurship which aims at creating job opportunities, is perceived as a great determinant in poverty eradication. The concept of sustainable economic development is widely recognized as a paradigm of development especially for the human society. The key objective of this paper is to examine whether the relationship between entrepreneurship and Sustainable Development (SD) can stimulate economic growth in a global context. The roles of entrepreneurship as a cornerstone of sustainable economic development are also outlined. Additionally, the paper defines 'entrepreneurship' and 'sustainable development' based on other authors and analysts' point of view while showing progress and advancements over time. Although entrepreneurship can be directly linked to a sustainable economic nation, entrepreneurs face some challenges in fostering sustainable economic development. The methodology involves a systematic review of literature by scholars who did previous work in professional journals, government articles, internet and other books as points of reference. This paper mainly focuses on explaining the role of entrepreneurship in obtaining sustainable economic development. It examines whether different measures of entrepreneurship can explain economic growth in a global context. Further to this, the paper explains the impact of sustainable economic development on entrepreneurship.

Keywords: *Entrepreneur, entrepreneurship, sustainability, sustainable development, sustainopreneurship, sustainable economic development.*

Business Innovations and Organizational Performance of Beverage Firms in Kenya**Maina, E. W¹, Kinyua, P. G², Muriithi, R. W³**¹*Kirinyaga University, ^{2,3}Dedan Kimathi University, Kenya***Correspondence:** *evemaina@kyu.ac.ke***Abstract**

In a highly competitive environment, innovation is key to a firm obtaining a dominant position in the environment and gaining greater performance. Organizations are opting for business innovations as a response to increased business environmental turbulence and complexity. Understanding how business innovation management lead to sustained organizational performance is key to compete in a fundamentally different way. This study investigated impact of business innovations strategy on organizational performance of beverage firms in Kenya. The specific objectives of the study were to determine how process innovation impacts organizational performance of beverage firms in Kenya. The study employed a descriptive survey research design. The population of the study was 180 composed of managers from the beverage firms in Kenya. Stratified sampling was used to select a sample size of 72. The study used a structured questionnaire to collect primary data, which was analyzed using Statistical Package for Social Sciences for descriptive and inferential statistics a positive significant relationship between process innovation and organizational performance of beverage firms in Kenya. The study concluded that process innovation is very crucial to an organization and significantly contributes to organizational performance of beverage firms in Kenya.

Keywords: *Process innovation, organizational performance, business innovation, beverage firms.*

Influence of Monetary Policy on Financial Performance of Deposit Taking Saccos in Kenya

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Abstract

Monetary policy is one of the principal economic management tools that the government uses to shape economic performance. The government through the Central Bank uses monetary policy tools like open market operations, central bank rate and cash reserve ratio for commercial banks with the objective of managing multiple monetary targets. Hence the monetary policy is a key interest rate driver in financial intermediation industry that affect interest rate spread in DTS. Through the monetary policy, the Central bank controls the cost of short-term borrowing to ensure price stability and general confidence in the currency. Although monetary policy as an interest rate driver is important in influencing the cost of funds and in determining interest income in DTS, the nexus between monetary policy and DTS's financial performance in Kenya has not been well established. The purpose of this study was to establish the effect the monetary policy on financial performance of deposit taking savings and credit cooperative societies in Kenya. The study used stratified random sampling technique to identify a sample of 74 deposit taking SACCOs in Kenya while secondary data was obtained from DTS annual audited financial reports. The study employed descriptive analytical statistical methods such as mean, variances and standard deviations while inferential statistical methods used were Pearson moments of correlation and fixed effect panel regression analysis. Regression results revealed that monetary policy had a positive coefficient of 1.09 and p-value of 0.226. A 5% significant level, there was statistically insignificant relationship between monetary policy and financial performance of DT SACCOs in Kenya. Thus deposit taking SACCOs should take proactive measures aimed at ensuring external borrowing is reduced to bare minimum to reduce the risks associated with interest rate fluctuations.

Keywords: *Monetary policy, interest rate, DTS, Central Bank of Kenya, financial performance.*

Risk Management Strategies and Sustainable Competitive Advantage of Commercial Banks in Kenya

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Abstract

Every opportunity and every decision involve some risk and uncertainty. Successful firms realize the dramatic difference between taking active risks and sitting passively at risk. When firms decide to engage in business across borders, the risks are severe, and the option of staying in the mother country has its own share of risks of inaction in the face of competitors that are bolder and more agile. Achieving sustainable development and success involve implementing best strategies for dealing with risks. The objective of this study was to examine the effect of risk management strategies on the sustainable competitive advantage of commercial banks in Kenya. The specific objectives of the study were; to We investigated the impact of risk avoidance strategies on sustainable competitive advantage of effect of risk transferring strategies on sustainable competitive advantage and impact of risk absorption strategies on sustainable competitive advantage of commercial banks in Kenya. The study adopted a descriptive research design that employed survey methods. Data was collected using self-administered questionnaires. The target population was the risk managers of all the 43 commercial banks in Kenya. Data were analyzed using mean, standard deviation and regression analysis. Risk avoidance strategies positively but insignificantly affected sustainable competitive advantage while risk transferring strategies had a positive but insignificant effect on sustainable competitive advantage. On the other hand, risk absorption strategies positively and significantly contribute to sustainable competitive advantage.

Keywords: *Risk management strategies, sustainable, competitive advantage, Commercial Bank, Kenya.*

Assessing the Effects of COVID-19 and Impacts of Tourism on Kenya's Economy

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Abstract

In order to understand the effects of Covid-19 on tourism and their impacts on Kenya's economy, this report focuses on inter-industry linkages and multiplier effects of expenditure. Multipliers can be used to analyse the impacts and effects of changes in tourism demand; policies and regulations that affect tourism activity either directly or indirectly; factors beyond the direct control of the industry; public and private investment proposals; resource allocation; and policy and management of tourism development strategies. The primary objective of this study was, therefore, to evaluate the effects of Covid-19 on tourism and the consequential impacts on the economy for the year 2020. The input-output/Social Accounting Matrix (SAM) models were used to estimate the impacts and linkages of tourism in terms of output production, employment generation, labour income earnings and total value creation. The relationships between expenditure and output, and income and employment (direct, indirect or induced) are described by multipliers. Data for analysis was sourced from multi-region input-output table (MRIO) database: <http://www.worldmrio.com/> and the Kenya Draft Tourism Satellite Accounts (2019). All impacts have a starting point in the economy, defined as the direct effect. The direct effect sets off iterations of indirect (inter-industry production) and induced (labour) spending. Internal tourism consumption is an aggregate that describes the size of direct visitor acquisition within a country of reference i.e. inbound and domestic tourism combined. There are several different types of multipliers depending on the secondary effects included and the measure of economic activity used. The common multipliers computed were associated with output, income, value addition and employment in the economy for the year 2020. Overall, the economy lost 1,297,000 full time equivalent jobs, Kshs193.2 billion in labour income, Kshs492.6 billion in value addition and Kshs831.1 billion in output as a result of Kshs378.2 billion losses in earnings by tourism connected industries. Future studies can re-estimate the multipliers by adopting a more robust methodology such as Computable General Equilibrium (CGE) model.

Keywords: *COVID-19, impacts, tourism, economy, Kenya*

Mortgage Financing Options and the Sustainable Growth of Real Estate in Nairobi Metropolis, Kenya

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Abstract

Real estate business is an undertaking that has been perceived as a project that needs a lot of capital to initiate. In Kenya, investing in real estate has been a huge venture for the last 10 years as demand for housing continues to rise. This research aimed at establishing the perceived role of financing options on the sustainable growth of real estate in Nairobi Metropolis, Kenya. It is difficult to fund big projects in real estate solely from personal savings. There is need to use other sources of finance such as equity, mortgage, or venture capital. This research paper was guided by four specific objectives; to assess influence of mortgage financing on the sustainable growth of real estate in Nairobi Metropolis; to evaluate the effect of savings financing venture capital financing and equity financing on the growth of real estate in Nairobi Metropolis. This study used primary data collected using a structured questionnaire from registered developers in Kenya with an interest in Nairobi Metropolis. The sample size was 81 out of a population of 100 developers registered with Kenya Property Developers Association. The study employed descriptive research design and data was analyzed through multiple regression analysis. Results showed that the variables addressed explain 93% of the growth of while mortgage financing and equity financing contributed immensely to sustainable growth of the real estate sector in Nairobi Metropolis in Kenya.

Keywords: *Mortgage financing, sustainable growth, Real Estate, Nairobi Metropolis, Kenya*

**Impact of Covid-19 Pandemic on Micro, Small, and Medium-Sized Enterprises
Operating in Mombasa, Kenya
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Abstract

The outbreak of coronavirus disease (COVID-19) has severely affected the global and Kenyan economy. Major victims of the COVID-19 outbreak are micro, small, and medium-sized enterprises (MSMEs). This study aims to assess the impact of COVID-19 outbreak on these businesses and Strategies for coping with the pandemic. The study adopted an exploratory methodology with comprehensively reviewing the available literature, including policy documents, research papers, and reports in the relevant field. Data was collected from 110 MSMEs in Mombasa by administering an online questionnaire. The data was analyzed through descriptive statistics. Results indicated that most of the participating enterprises have been severely affected and were facing several issues such as financial, supply chain disruption, decrease in demand, reduction in sales and profit, among others. Over 80% of enterprises were neither prepared had plans to handle such a situation. More than three quarters of participating enterprises reported that survival of their business beyond 2020 was not guaranteed in the prevailing circumstances. A third of participating enterprises shut their business as a way of coping, approximately half either downsized or partially shut some of their operation while 20% turned to their savings or friends/chamas/SACCOs for financial support to sustain operations.

Keywords: *Covid-19 pandemic, micro, small, and medium-sized enterprises, Mombasa, Kenya.*

Effect of Organizational Culture on the Implementation of Corporate Strategy in Private Chartered Universities in Kenya

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Abstract

This study investigated the effect of organizational culture and corporate strategy implementation in Private chartered universities in Kenya. Organizational culture and strategy are two important factors that contribute to the growth of an organization and its business continuation; and for this to happen, it is important to consider the organizational culture that helps the process of strategy implementation. The competing values framework was adopted to identify the organizational culture types. The study adopted a positivist view as it aimed at testing hypotheses derived from a predetermined conceptual framework. Cross-sectional survey research design was adopted and used to collect both quantitative and qualitative data. The accessible population included Registrars, Deans, Directors, Heads of Departments, academic staff, and students' leaders. The study used stratified random sampling and the target sample size was 198 employees. Data from questionnaires was organized, coded, analyzed and converted into quantitative summary reports for analyses using the statistical package for social sciences (SPSS) version 21. The study used correlation and regression techniques as well as the analysis of variance (ANOVA) to test the study hypotheses. Correlation analysis was used to determine the effect of organizational culture and corporate strategy implementation in Private chartered universities in Kenya. A multiple linear regression model was also used to derive inferential statistical indicators. The key finding based on the tests conducted in the study was that the explanatory variables; Clan culture, Adhocracy culture, Market culture and Hierarchy culture had effect on the response variable (Implementation of corporate strategy in Private chartered universities in Kenya).

Keywords: *Organizational culture, corporate strategy, strategy implementation, quality assurance*

**Relationship between Biblical Context and Akurinu Mission with Emphasis on
Poverty Alleviation**

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Abstract

This study investigated the relationship between selected principle of biblical hermeneutics and contextual theology among believers in African Independent Churches (AICs), notably the Akurinu believers in Nairobi County, Kenya. The objectives of the study were: to find out the relationship between biblical context and fulfilment of mission among Akurinu believers and to determine the moderating effect of culture on the three predictors of contextual theology. Descriptive and correlation designs were used. The study was conducted among 2618 targeted believers who formed Akurinu congregations registered with General Conference of Akurinu Churches Assembly in Nairobi County. Data was analysed using Software Package for Social Sciences computer system to generate frequency distribution and Chi-square test was used on qualitative data to test agreement between variables. Wald Chi to test for independence in quantitative data. Logistic regression model was used to test hypothesis on quantitative data. Hierarchical model was used to test moderating effect of culture on predictor variable in the objective. Qualitative data were presented in frequency tables and percentages and inferential data were presented in relevant software tables. Based on $\alpha=0.05$ level, hypothesis statistically significant with predictive probability of odds ratio 0.245 of change on the variable. P-value for culture was 0.159, greater than $\alpha=0.05$, therefore moderating effect was statistically insignificant. Results showed that biblical context had a significant association with fulfilment of Akurinu mission. Findings could benefit churches and religious researchers interested in biblical contextualization, reduce theological challenges among Akurinu believers, and inform Christians, religious researchers and theologians.

Keywords: *Biblical principles, contextualization, biblical context, fulfilment of mission, culture.*

Transformational Leadership and Employee Performance in Sacco's in Nyeri County, Kenya

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Abstract

With increasing competition among today's organizations, stakeholders tend to be more concerned about probing the new ways of getting the employees more committed to what they do and to the organization as well. The role of leadership is an important determinant of employee's performance and commitment. The purpose of this study was to investigate the effect of transformational leadership on employee performance in Sacco's in Nyeri County. The specific objectives of the study were to establish the relationship between Intellectual stimulation and employee performance in Sacco's in Nyeri county. A total of 12 Sacco's in Nyeri County were randomly selected and surveyed as the population of the study comprising of 164 respondents. Stratified Random sampling technique was used to draw the sample of 66 respondents. A questionnaire and an interview guide were used for data collection with closed ended questions designed for the employees and an open ended interview guide for managers. A descriptive survey design was used. Data was analyzed using SPSS and multiple regression analysis. Results showed that transformational leadership in Sacco's led to improved employee performance. When managers utilized intellectual stimulation, there were positive reactions from employees. With the role of leadership in the modeling of employee commitment and performance considered very crucial in the modern organization, it was paramount for Sacco's to put more effort in entrenching transformational leadership in their organizations.

Keywords: *Transformational leadership, performance, intellectual stimulation.*

Entrepreneurship and Strategic Business Management for Sustainable Development

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Abstract

In the face of daunting business challenges, sustainable development requires developing new methods and approaches to suit the challenges and opportunities. Due to its growing recognition as a driver of sustainable development, entrepreneurship and strategic business management have become subject to research across many scientific disciplines. Thus, entrepreneurial enterprises, while being intervened by strategic business management are increasingly recognized as a driving force for innovation and competitiveness in achieving sustainable development. Despite this, past studies on nexus between entrepreneurship, strategic business management and sustainable development within organizational perspective are scarce and vague and not contextualized to developing economies like Kenya. Moreover, the studies lack clear conceptualization and operationalization of sustainable development constructs and relationship models including strategic business management antecedents and consequences. This study was guided by entrepreneurship theory, Management theory, and Ecological modernization theory. A systematically review of recent literature including a critical analysis of empirical of past findings on the subject matter. Most of the reviewed studies adopted a descriptive research design, covering particular samples of the target population. Random sampling was done and data collected using structured and unstructured questionnaires. Other studies used case studies and acquired required feedback. From the findings, if sustainable development is to achieve its potential, it must be integrated into the planning and measurement systems of business enterprises. sustainable development needs to be incorporated into the policies and processes of a business if it is to follow sustainable development principles which requires a new cultural orientation and extensive refinements to systems, practices and procedures. As part of recommendation, the concept of sustainable development must therefore be articulated in terms that are familiar to entrepreneurs and business leaders.

Keywords: *Entrepreneurship, strategic business management, sustainable development*

Situational Factors, Individual Factors, Marketing Factors and Behavior of Bread Consumers in Kenya

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Abstract

Globally, the demand for baked products has been on the rise and expected to grow by 13% by 2025 for a variety of bakes, and bread segment alone is projected to generate revenue worth US\$448,266m. African market is expected to grow by 6.9%, while Kenyan market is expected to grow by 6.7 %for the next 20 years. Despite this projected growth rate, not much research has been carried out to understand the predictors of consumer behavior in regard to the amount of bread bought. This is despite the fact that, knowledge of the outcome of consumer buying behavior assists firms in planning and implementing their marketing strategies. The purpose of this study is to analyze the factors influencing behavior of bread consumers in Kenya. Factors considered for this study were grouped into three: situational, personal characteristics and marketing factors. Primary data was collected from 1230 adult consumers in Kiambu and Thika towns of Kenya, and was analyzed quantitatively. Descriptive statistics was only used when analyzing the profile of the respondents. Multiple regression analysis was carried out to determine the effects of the explanatory variables on the dependent variable (amount of bread bought per week). From the results, the following variables had significant effect: time of the day (morning) (Coef 0.250, P-value 0.000), retail out let atmospherics (display) (Coef 0.263, P-value 0.000), Availability((Coef 0.113, P-value 0.000), Importance for brand name and logo(important) (Coef 0.250, P-value 0.000), Age(Coef 0.001, P-value 0.000), stage in family life(married) (Coef 0.038, P-value 0.008), health consciousness(high) (Coef 0.118, P-value 0.000), Price (Coef 0.0369, P-value 0.000), Income(Coef 0.0121, P-value 0.010). However, consumers' gender was insignificant (Coef 0.118, P-value 0.00). The findings are important since they could guide bakers and retailers when developing their marketing strategies, mainly communication, pricing, product development and distribution strategies.

Keywords: *Bakers, bread, situational factors, personal characteristics and marketing factors.*

Financial Sustainability of Sacco's in Kenya: Challenges and Opportunities.

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Abstract

Saving and credit cooperative societies contribute immensely to economic development, alleviation of poverty and unemployment in the developing and developed nations. Despite this contribution, many Saccos have been faced with challenges which may threaten their sustainability and survival. This study sought to investigate the major challenges that have threatened sustainability of Saccos in Kiambu County and propose practical solutions that can be adopted by the Saccos to ensure their survival. Guided by a descriptive survey design the study randomly sampled fifty (50) deposit taking Saccos which formed the basis of investigation. Data was collected with the help of a self-administered questionnaire and analyzed using descriptive statistics. Results showed that among the challenges facing the sampled Saccos, three featured prominently, including competition from other financial institutions such as commercial banks, microfinance institutions, insurance companies and pension provident funds. Majority of the Saccos are struggling with capital inadequacy and poor liquidity management which is fuelled by poor leadership and improper governance structures. To alleviate competition challenges the it is recommended that Saccos should adopt aggressive marketing strategies and diversify their sources of funds. To deal with inadequacy of capital and liquidity management challenges, directors of Saccos should develop and implement effective internal control system to ensure proper control, monitoring and maintainance of proper levels of cash flow in order to address. Dealing with the challenge of poor leadership and governance the study recommends that the directors should adopt good cooperative governance principles with regard to appointment of the board of directors, remuneration and determining their terms of service.

Keywords: *Financial sustainability, sacco's in Kenya, challenges, opportunities*

**Internal versus External Orientation, Which Way for Competitiveness?
Entrepreneurship and Strategic Business Management for Sustainable
Development**

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Abstract

Managerial cognition continues to attract interest from researchers in a bid to understand how it relates with performance of organisations. Drawing from the Social Cognitive theory the relationship between managerial orientation (internal vs external) and competitiveness of leather and textile firms in Kenya was determined using a descriptive cross-sectional survey of a sample of 163 respondent managers using a structured self-reporting questionnaire. The firms were moderately competitive ($M = 3.86$, $SD = 0.40$) and both internal and external orientation were significantly positively related with competitiveness (internal focus: $r = .465$, $p < .001$; external focus: $r = .406$, $p < .001$; combined internal/external: $r = .463$, $p < .001$). Competitiveness was more strongly predicted by internal managerial orientation ($Wald = 17.197$, $p < .001 < .05$, $\exp(B) = 4.777$) than external managerial orientation ($Wald = 1.588$, $p > .208$, $\exp(B) = 1.575$). This is one of the first attempts to examine competitiveness using a cognitive lens in an emerging economy. These findings have implications for theory and practice on where managers should prioritize their actions between internal and external orientation to achieve competitiveness.

Keywords: *Managerial orientation, competitiveness, Kenya*

Impact of Public Debts on Private Investment in Kenya

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Abstract

Private investment is a catalyst for economic growth, development and employment. However, excessive borrowed funds result in accumulation of debt which is harmful for sustained economic growth. Kenya has been listed as one of the highest indebted countries in Africa. This study analyzed the impact of public debts on private investment in Kenya from 1978-2020. The study used the causal-effect research design using a sample of 43 years' time series data from 1978-2020. Data was analyzed using SPSS and E VIEWS statistical package. Using the error correction model, results indicated that external debts, internal debts and debt interest have a negative and significant effect on private investment in Kenya. They should limit borrowing both internally and externally where possible, come up with appropriate debt management strategies, widen the tax base to meet its expenditure and encourage private investment through investment incentives.

Keywords: *External debts, internal debts, debt interest, private investment.*

Effect of Entrepreneurial Business Finance on Growth of Micro and Small Enterprises in Kenya

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Abstract

Success of business enterprises is dependent on its capacity to management its working capital. The capacity of an enterprise to manage its working capital will determine its capacity to service short term liabilities and collect account receivables. This study aims at examining the effect of entrepreneurial business finance on growth of micro and small enterprises in Kenya. Descriptive research design will be adopted and primary data collected through administration of questionnaires. The target population will comprise of 519 385 micro and small enterprises from manufacturing, service, trade and other sectors. A sample of 400 will be selected through simple and stratified sampling techniques. Reliability will be evaluated through use of Cronbach Alpha coefficient. Data will be analyzed using descriptive and inferential statistics. Study findings will be presented in tables and figures.

Keywords: *Business Finance, growth of MSEs, micro and small enterprises, financial planning, cash flow management, e-commerce.*

The Impact of Macro-Economic Factors on Construction Output in Kenya

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Abstract

Currently in Kenya, the relationship between construction industry output and macro-economic factors is not clear. In actual practice, that relationship is normally expressed in qualitative and heuristic terms which are often inaccurate. This is a cause for concern since the industry plays a major role in the country's economy. For instance, all the constructed facilities in the country are supplied by the construction industry. Without further elucidation on the roles of the construction industry, it can simply be termed as the backbone of the economy without which, the economy cannot stand. Therefore, this paper empirically presents a study indicating objectively how macro-economic factors impact on annual construction output in Kenya. The study further demonstrates how these can effectively be used as policy decision basis for the management and control of output for the construction industry. We investigated the influence of macro-economic factors on annual construction output in Kenya. To achieve these objectives, this study followed a quantitative approach where a longitudinal study design was adopted. The study variables included annual construction output, inflation rate, unemployment rate, commercial banks weighted interest rate, population growth rate and US dollar to Kenya shilling exchange rate. Time series data analysis was used to analyze data obtained from central bank of Kenya (CBK) and Kenya National Bureau of Statistics (KNBS) with the aid of abstraction sheet or checklist covering forty-three (43) years from 1977 to 2019. Eviews; a statistical computer software package was used to analyze the data where annual construction output was regressed on annual macro-economic factors. The first differences of natural logarithms of annual construction output, second differences of population growth rate, first differences of commercial banks weighted interest rate, unemployment rate, inflation rate and US dollar to Kenya Shilling exchange rate were used in the analysis. Multiple regression output tables of current and lagged macro-economic variables showed insignificant influence of macro-economic factors on annual construction output in Kenya in 2020. It was however observed from regression of lagged macro-economic values that construction output in Kenya responds to the effects of the factors more than a year after they are implemented. Models to this effect have been developed having coefficients of determination (R^2) values of 0.13 and 0.48 respectively. It is therefore illogical to conclude that the factors have impact on construction output on the current year but in the later years as indicated by a higher R^2 value of 0.48 against an R^2 value of 0.13 in the current year. Based on the results obtained, we propose that macro-economic factors can be used as policy instruments for managing and controlling Kenya's construction industry.

Keywords: *Construction output, constructed facilities, time series analysis, stationarity*

Evaluation of Cost-Benefits of Oyster Mushroom Production using Innovative Water Hyacinth Substrate for Sustainable Development of SME, Kenya.

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Abstract

Oyster mushroom is edible and belongs to fungi Kingdom and can play a key role in economic development of a country. It can also contribute immensely to human wellness through enhancement of body immune system when consumed regularly. The Potential of oyster mushroom production in Kenya has not been exploited fully due to insufficient substrates and Small-Medium Enterprises(SMEs) engaged in mushroom business suffer due to scarcity of the commodity and lack of strategic management of entire value chain system. The demand for the commodity and its forms utility has been high and is continually increasing. Therefore, there is need to evaluate the Cost-Benefits of Oyster Mushroom Production Using Innovative Water Hyacinth Substrate for Sustainable Development of SMEs in Kenya. This study sought to determine economic Net present Value (ENPV) and determination of Economic Benefit-Cost Ratio (EBCR) of oyster mushroom. The Benefit-Cost Analysis (BCA) technique was used for evaluation. Results showed that innovative water hyacinth substrate can spur oyster mushroom production. There is need to invest more funds to conduct research on this substrate particularly roots, stems and leaves to fully utilize the plant economically. Investing on production of oyster mushroom can potentially lead to poverty reduction, reduction of unemployment and support sustainable business opportunity for SMEs.

Keywords: *Innovative mushroom production, cost benefit analysis, strategic management, sustainable development.*

Textile Market Responses to Covid-19 In Nairobi County. Creating Resilience in Textile Value Chain

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Abstract

The government of Kenya undertook various measures to curb the spread of Corona virus (Covid-19), including limiting movement in places with reported cases; closure of public spaces with high human traffic, such as schools and public events; dusk-to-dawn curfews; and ensuring basic hygiene and social distancing. However, these precautionary measures have had negative economic impacts on businesses and workers. The country witnessed job cuts across various sectors, and incomes of businesses and available working hours for staff significantly fallen. This paper presents a critical appraisal of the impacts of Covid-19 on textile industry value chain in Kenya. The purpose of this study was to examine the impact of Covid-19 pandemic on textile industry focusing on both effects and strategies that were employed to provide stability and resilience in the industry. The specific objectives of this study were to assess the impact of Covid-19 travel restrictions on textile value chain; establish how textile value chain was impacted by economic lockdown in Kenya due to Covid-19 and examine how the textile industry rebuilt resilience to stabilize the impacts of the pandemic. Using stratified and random sampling, this study used 160 respondents including 10 producers, 60 traders and 90 consumers of apparels. A descriptive survey research design was employed to collect data using a questionnaire and an interview guide. This study utilized both chi-square test of independence and regression modelling to assess the impacts of the covid-19 measures on production, trading and consumption of apparels. The study established that travel restrictions and economic lockdown had an effect across the textile value chain but at different levels. Among the consumers there was a significant relationship between Covid-19 and need to purchase (p -value = .002), frequency of purchase (p -value = .019) and quantity of purchase (p -value = .000). There was a significant relationship between Covid-19 measures and textile trading and production. Mask and personal protective gears were taken up by both small and large producers to cushion them from common apparel making. The study observed that textile industry was equally hit by Covid-19 and since it is a key sector for thousands of livelihoods the study recommended that the government sets aside funds to boost the sector through loans and provide an expanded market for larger producers.

Keywords: *Textile value chain, covid-19, market response, resilience* **Keywords:** *Credit, market, entrepreneurship, skills, training, group dynamics, enterprises.*

Influence of Youth Enterprise Development Fund on the Growth of Entrepreneurial Group Based Youth Enterprises in Nairobi County, Kenya.

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Abstract

To mitigate challenges affecting youth group based enterprise growth Government of Kenya, introduced Youth Enterprises Development Fund (YEDF) in 2006. So far more than 11billions have been disbursed to youth enterprises. However, in spite of massive investment by the government on youth enterprises its influence on the growth of entrepreneurial youth group based enterprises (YGBE) has not been well understood and the moderating role played by group dynamics in the relationship between YEDF and growth of Youth Group Based Enterprises is unknown. The purpose of this study was therefore to investigate the influence of Youth Enterprises Development Fund model, on the growth of entrepreneurial Youth group based small and medium enterprises (SMEs) in Kenya, with special focus on the influence of access to credit, access to market, entrepreneurship skills training and the moderating role of groups dynamics, on the relationship between the YEDF and growth of youth based small and medium enterprises. A cross sectional survey design was adopted on a sample of 121 from a population of 255 entrepreneurial youth group based enterprises that have benefited from YEDF loans in Nairobi County, Kenya. Data was collected through questionnaires from group leaders. A pilot study showed Cronbach Alpha coefficients of 0.7 for all variables. Data from questionnaires was organized, coded, analyzed and converted into quantitative summary reports for analysis using Statistical Package for Social Sciences (SPSS) version 22 The study used correlation and regression techniques as well as analysis of variance (ANOVA) to test the study hypotheses. Correlation analysis was used to determine the effect of access to credit, access to market, entrepreneurship skills training and growth of youth group based enterprises in Kenya by computing Pearson product moment correlation. A multiple linear regression model was also used to derive inferential statistical indicators like the correlation, coefficient of determination, F-statistics, t-test statistic and the p-value. The key finding based on the tests conducted in the study was that the explanatory variable: Access to credit and entrepreneurship skills training had effect on the response variable while access to market had no effect on the response variable (growth of entrepreneurial youth group based enterprises in Nairobi County). Group dynamics had predicative effect but had no moderating influence on the relationship between YEDF and growth of entrepreneurial youth group based enterprises. The study findings not only form a basis for plan of action by policy makers on enterprises funds, but also add to the body of knowledge on enterprise funding. It is recommended that youth be involved in the designing of youth enterprise funding programs, that credit amounts be increased, Training needs analysis be conducted, establishment of group formation conditions be defined and age, experience and level of education be considered in appointment group leaders.

Keywords: *Credit, Market, Entrepreneurship, Skills, Training, Group Dynamics, Enterprises.*

**Effect of Value Chain Design on Performance of Improved Indigenous/Kienyenji
Chicken's in Kirinyaga County
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Abstract**

Access to inputs would aid in achievement of desired output among improved chicken farmers. Thus, the study investigated the effect of value chain design on performance of improved indigenous (kienyenji) in Kirinyaga County. Descriptive research design was applied and primary data gathered among 103 respondents. Data was analyzed using descriptive and inferential statistics. Study findings indicate that production of improved kienyenji chicken in Kirinyaga County was positively affected by inbound logistics, operating activities, outbound activities and support activities. It was concluded that there is need for provision of requisite inputs that would optimize performance of improved indigenous chicken in Kirinyaga County.

Keywords: *Value chain, inbound logistics, outbound logistics, operating activities.*

Effect of Natural Disasters on the Productivity of Micro, Small and Medium Enterprises in Kenya: A Case of Flood Events in Nyanza Region

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Abstract

The direct and indirect effect of natural disasters are devastating to business activities and their stability. These cataclysmic events have created a significant sway on micro and small and medium- sized enterprises (SMEs) in Nyanza region in the recent past. Micro and SMEs sectors can be considered as highly susceptible sections of Nyanza region economy which was impacted drastically by the floods as they are relatively resource constrained and less resilient. Having a sound understanding of the adverse effect of floods on Micro and SMEs might be useful for entrepreneurial resilience. This study sought to explore the full range of effect experienced by Micro and SMEs located in Nyanza region following recent flooding in mid-2020. A hundred randomly selected floods affected Micro and SMEs from Kano plains of Kisumu County, were surveyed for this study. Semi structured interviews were carried out in person with the business owners in order to identify their experiences on various types of damages, rehabilitation and re-establishment. One of the major outcome was the Micro and SMEs are susceptible to flooding in four fronts: Capital, labour, logistics and markets. Revenue have fallen below the expectations. Another serious finding was manpower as workers were the immediate victims of flood. Entrepreneurs had to find out alternative or emergency logistic support to operate their businesses as floods severely dented the infrastructure system. A change in market demand had occurred in the short-term with sharp increase in the demand for basic commodities while a dip in non-essentials. Further, it was clear that the SMEs resilience requires partnerships and cooperation among the firms, the government and other private organizations. This study concludes by providing some recommendations on strategic policies and disaster risk reduction and coping mechanism for the Micro and SMEs sector in Kenya.

Keywords: *Floods, micro and SMEs, natural disaster, Kano plains, entrepreneurs*

Determinants of Family Life Cycle as Demographic Segmentation Practices on Consumer Choice of Ready to Wear Clothes in Kenya

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Abstract

Segmentation is the division of a large market into smaller homogeneous market targets on the basis of common needs and/or similar lifestyles. One of the primary aims of segmenting a business sales programme is to focus on the subset of prospects that are mostly likely to purchase its offering. Segmenting on demographic variables involves dividing consumers with regard to their age, life cycle, income, and occupation. But despite the increase in the use of ready to wears clothes the sale of second-hand clothing called "mitumba," has also been on the rise. The study specifically focused on the influence of family life cycle on consumer choice of ready to wear clothes in Kenya. The study adopted market orientation theory, marketing mix. A descriptive survey was used to obtain in-depth information from respondents. Purposive sampling was used to select ready to wear shops from the three cities in Kenya namely Nairobi, Mombasa and Kisumu. The study adopted Nassiuma's formula to get the overall sample size of 83 respondents from ready to wear entrepreneurs' shops from the three cities. Closed-ended questionnaire was used to collect data desirable for the study. Qualitative data was analysed by use of content analysis and presented in a prose form. On the other hand, Quantitative data was analysed by using of Statistical Package for Social Sciences (SPSS) version 24. Data was analysed using both descriptive and inferential statistics. There was a positive significant relationship between family life cycle on consumer choice of ready to wear clothes as shown by a regression coefficient of 0.563. According to perceived values in ready to wear industry, different sets of products and different types of advertising strategies should be applied for people of different status.

Keywords: *Family life cycle Demographic Segmentation, consumer choice, ready to wear clothes.*

SUB -THEME: EDUCATION FOR POVERTY ALLEVIATION

Factors that Influence the Uptake of Research Evidence into Education Policy and Practice in North-Western Nigeria**Ibrahim, S. D.***Sule Lamido University, Kafin Hausa, Nigeria***Correspondence:** danladis.ibrahim@slu.edu.ng**Abstract**

This study examined factors that influence uptake of research evidence into education policy and practice in north-western Nigeria. A multi-stage research approach was used and descriptive survey design was employed to analyze teacher situations in the states, factors responsible for poor performance of pupils, gather and produce evidence towards solving the problems identified, present the evidence to stakeholders, and analyze factors influencing evidence uptake and policy formulation. The study determined the extent to which evidence production influence the uptake of evidence into policy and practice and the extent to which evidence presentation and engagement influence uptake of research evidence into policy and practice. Results showed that evidence presentation and engagement influence the uptake of evidence into policy and practice than evidence production. It is therefore recommended that researchers in Nigeria should engage and present the findings of their study to stakeholders against the current trends of keeping the findings in libraries and publishing in academic journals. Education Data Research and Evaluation in Nigeria (EDOREN) provided technical and financial support for the conduct of this research

Keywords: *Education policy and practice, evidence production, evidence presentation and engagements.*

Internal Communication and Employee Engagement in Technical Training Institutions in Kenya

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Abstract

Employee engagement and communication are invaluable in achieving effective performance and efficiency resource management. This study investigated the effect of communication mode, quality of messages, communication direction and moderating effect of management style on the relationship between internal communication and employee engagement in technical training institutions in Kenya. The study was conducted using survey research design. Study population was all the 3780 trainers in the 102 technical institutions in Kenya of whom a sample of 360 respondents was used. Stratified random sampling, random sampling and stratified proportionate random sampling technique design were employed. Data was collected using a questionnaire which had both closed and open-ended (Likert type scale 1-5) questions distributed to 360 respondents out of whom 322 completed the questionnaires giving a response rate of 89.4%. Cronbach's alpha was used to test for internal reliability of each variable used in the study. Data analysis was done using descriptive and inferential statistics. Results showed that internal communication has a significant effect on employee engagement could be a predictor of employee engagement among the trainers of technical institutions in Kenya and that management style had a moderating effect on the relationship between internal communication and employee engagement.

Keywords: *Internal Communication, employee engagement, technical training institutions, Kenya*

**An Evaluation of the Influence of Depression among First Year University Students
in Kenya**
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Abstract

University students have been the focus of negative headlines about everything from binge drinking to campus crime but now a new concern may dwarf the earlier crises namely: an alarming increase in cases of mental illness on college campuses. The average age of onset for many mental health conditions is the typical University age range of 18 to 24 years. The common stressors include greater academic demands; new financial responsibilities; changes in social life; exposure to new people, ideas and temptations; greater awareness of sexual identity; and anxiety about life after graduation. Additionally, the transition from high school to University is filled with anticipation, excitement, and enthusiasm. Along with the positive feelings often associated with university life, challenges include; geographic changes, the rigors of academics, loss of familiar surroundings, and an entirely new interpersonal environment among other challenges. Indeed, from a developmental perspective, the age at which many students begin their higher education has important implications for adjusting effectively to the University landscape. The process of identity development accelerates during the college years due to increased opportunities and freedom to explore various careers, lifestyles, and worldviews that were not as prevalent during high school. Navigating the process of identity development can lead to self-doubt, social withdrawal, loneliness, lowered self-esteem, and even depression. A recent survey involving 1,455 students, reported that of those students who experienced depressive symptoms since beginning University, the four most commonly cited reasons for their depression were academic problems, loneliness, economic problems, and relationship difficulties. Thus although many University students are able to experience the pleasures and novelties of college life without experiencing debilitating adjustment difficulties, a significant number develop elevated levels of depression during these formative years.

Keywords: *Depression, anxiety, mental health, prevalence, mentorship, university students, counselling.*

An Assessment of Personality Traits on Prevalence of Suicide Ideation and Attempts in Public Secondary Schools in Murang'a County, Kenya.

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Abstract

The contemporary society is characterized by several problems among students in secondary schools. Some may be psychosocial leading to suicide ideation and attempts. This study sought to assess the psychosocial factors in public secondary schools in Murang'a County. The study explored the influence of personality traits on suicide ideation and attempts among learners in public secondary school students in Murang'a County, Kenya. Interpersonal theory by Thomas Jioner and Psychological theory by Edwin Scheidman, a mixed methodology of descriptive survey and ex- posto facto for quantitative research and phenomenology was used for qualitative research for data triangulation. The target population comprised of the 5940 students, 116 Guidance and Counseling teachers, 289 class teachers and 8 sub county educational officers, parents and suicide attempters. The sampled 642 respondents comprising 560 students using cluster sampling, suicide attempters and parents using snowballing, 56 class teachers, 8 sub county educational officers and 28 Guidance and Counseling teachers were sampled using purposive sampling. Data was collected using questionnaires for the students, interview guide for Guidance and Counseling teachers, Sub County Educational Officers, interview guide for parents and suicide attempters and focused group discussions for the teachers. The instruments were piloted and tested for reliability at 0.6 reliability coefficients while validity was established for both quantitative and qualitative data. For qualitative data, trustworthiness was established by triangulating data from interviews and focus group discussions and the technique used was credibility. Data was analyzed using thematic analysis for qualitative data while quantitative data was analyzed using both descriptive and inferential statistics like frequency tables and theregression model. Results showed that personality traits had significant contribution to the frequency of suicide ideation and attempts in Murang'a County, Kenya. There is need to empower of the students on positive self-esteem and confidence by the teachers and use of various psychological therapies to deal with personality disorders by the guidance and counseling teachers. Establishment and strengthening of Guidance and Counseling programmes is suggested, training guidance and counseling teachers to reach out to the students, fostering life skills among the students to cope with the day-to-day challenges, enhancing the co-curricular activities and change of behavior attitudes among the students. Parents need to appreciate their children just as they are and should not peg their worth on academic performance while schools should put in place suicide prevention programmes.

Keywords: *Suicide, personality traits, psychological factors, self-esteem, suicide ideation, suicide attempts*

Effects of Lecture Teaching Strategy on Performance in English Subject in Secondary Schools in Uasin- Gishu County, Kenya

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Abstract

Despite the critical role English plays nationally, regionally and internationally, its performance in national examinations is still below expectation. In Kenya, English plays a crucial role in national development; it's an official language and an examinable subject for all candidates at KCSE. The purpose of this study was to assess the effects of lecture teaching method on performance in English subject in secondary schools in Uasin- Gishu County, Kenya. The study attempted to determine to what extent the lecture method contributes to performance in English subject in secondary schools in Uasin- Gishu County. The study was guided by communicative language teaching (CLT). Cross-sectional descriptive survey design was used in the study. The target population was all secondary schools Principals, teachers of English and students in Uasin-Gishu County. Simple random sampling was used. Questionnaires were used to collect data and data analyzed using descriptive statistics which included mean, standard deviation, percentages and frequencies. These were presented in a table. Results shpwed that the study variable lecture teaching method influenced performance in English subject in secondary schools in Uasin-Gishu County. It is recommended that Teachers of English should use student centered instruction to promote active student engagement in learning and that the Ministry of Education should provide teaching resources such as computers, films, slides and projectors that enhance interactive learning. In addition, teachers of English should use discovery and inquiry methods in teaching and learning of English for effective interaction and the school learning and assessment policies should prioritize improvement of students' performance.

Keywords: *Effects, lecture strategy, performance, English subject.*

E-Learning Effective in Poverty Alleviation through Technical and Vocational Education and Training

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Abstract

E-Learning in the current changing times has been a prerequisite for effective teaching and learning in Technical and Vocational Education and Training Institutions due to the increased demand for continuous learning and skills development which play a role in poverty alleviation. The tremendous advancement in technological developments in computer applications coupled with the changing time's expectations of the world of learning has culminated in a new concept of teaching, learning, science and research. Tertiary institutions on realising the need to be relevant and competitive; have invested heavily in ICT infrastructure to support learning. The study sought, therefore main objective is to determine the role of E-learning in poverty alleviation through Technical and vocational education. This paper is based on a comprehensive analytical review of the available literature evidence on E-Learning as a standard conception, poverty alleviation, and how Technical and Vocational Education and Training Institutions manifests themselves in these concepts. The study examines the role that E-learning plays in poverty alleviation through Technical and vocational education and training, and the challenges and opportunities of adopting e-learning in alleviating poverty. Results showed that Technical and vocational education race to advance E-learning course capability has greatly enhanced alleviation of poverty.

Keywords: *E-learning, technical and vocational education and training (TVET), poverty, alleviation*

The Effect of Testing Conditions on the Students' Test Performance of Distance Learning System (DLS) in Jigawa State, Nigeria.

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Abstract

This research was carried out to investigate and ascertain the extent to which test administration affects performance of cycle three (3) NCE Distance Learning System (DLS) students in achievement test. The study investigated whether type of sitting arrangement and ventilation affects performance of students in the examination. The population of the study was the cycle 3 NCE (DLS) students 2018/2019 session of eight study centers in Jigawa State Nigeria comprising of 739 students. From the population, 248 students were sampled. The methodology used was ex-post-facto survey design and a checklist was used as an instrument for data collection where students were observed in order to ascertain the testing condition at the time of writing education examination. Moderated raw examination scores for the sampled students were collected and analyzed using T-test independent sample analysis tool. There was a significant difference in performance of students by sitting arrangement and ventilation in the testing room. Students who wrote the examination with good sitting arrangement and in a ventilated examination site performed significantly higher than their counter parts who wrote in poor sitting arrangement and inadequate ventilation in the testing room. In view of the findings of the study, recommendations were made on ways of improving the quality and standard of test administration in the Distance Learning System.

Keywords: *Test conditions, test administration, sitting arrangement, ventilation.*

Morphological Analysis of Hybrid Compound in Hausa Language

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Abstract

This paper makes a morphological analysis to the hybrid compound. Ethnographical methodology was adopted in the process of the analysis. This research also adopted the Natural Morphology Theory (NMT) which is concerned with relationship between morphemes within a word and their meaning; thus analysing the relationship between expression and meaning. Results showed that Hausa hybrid compound expression employ genitive linker in its formation with a systematic conceptualization in which the meaning of the two different languages embedded (guest) and matrix (dominant) languages that produced the hybrid is not deduced separately but as whole.

Keywords: *Morphological, analysis, hybrid compound, Hausa language*

Teacher-Student Communication and Prevention of Teenage Pregnancies in Public Secondary Schools in Narok County, Kenya

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Abstract

Sexuality plays a very significant role in the lives of both boys and girls. Teacher communication is therefore important in preventing teenage pregnancies among students in secondary schools. This study sought to establish the advisory communication function of teachers in preventing teenage pregnancies in Narok County Kenya. A mixed research design was used in the study combining qualitative and quantitative study approaches. The population of the study included all the 8994 female students from 52 secondary schools in Narok County in the year 2019. Respondents were aged between 13-19 years attending both boarding and day public secondary schools in Narok County. Stratified technique of sampling was used to sample the population into strata. The study selected proportionally the subjects from different strata. Total study sample size was 536; 500 respondents for the questionnaire, 12 for the interview, and 24 for the focus group discussions. A questionnaire, key informant interviews and focus group discussions were used to collect data. Quantitative data was analyzed using Statistical Package for Social Sciences computer software package (SPSS statistics version 22). Descriptive statistics drawn include mean, and standard deviation which were presented in tables, frequencies and percentages. Inferential statistics drawn include multiple regression and correlation analysis. Results showed that perception of the function of school counselors contrasted greatly between teachers and counselors. The misperceptions result in inconsistent, incomplete, or ineffective guidance program. Thus school administrators and teacher counselors should always consider these misconceptions when establishing guidance and counseling services. The teachers should additionally be provided with communication skills to enable them communicate effectively with the students about sex issues.

Keywords: *Advisory communication function, preventing teenage pregnancies*

Primary Schools' Development in Somaliland - The Role of Community Education Committees

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Abstract

The study sought to determine the methods used to involve the community in school infrastructure projects and the extent and effectiveness of the community education committee participation process. Done as a cross-sectional survey using mixed methods of inquiry, the study targeted 1002 respondents consisting of 920 head teachers and 82 officers in charge of District Education (DEOs) in Somaliland. The sample comprised 257 head teachers and 22 DEOs. Multi stage sampling was used. Purposive sampling was used to draw a sample of regions, stratified random sampling to draw a sample of head teachers while simple random sampling was used to draw a sample of DEOs. Pilot testing of the questionnaire was done on 28 headteachers. DEOs were interviewed while Headteachers filled questionnaires. Reliability of the questionnaire was ensured using Cronbach alpha. Empirical literature review, peer review and pilot testing were used to ensure validity. The response was received from 20 DEOs and 247 headteachers. Thematic analysis was used to analyse interview data collected from DEOs. Headteachers data collected by questionnaire were analysed using descriptive statistics. Involving the community in decision-making, offering free labour and fundraising were the leading methods of engaging communities in school infrastructure projects. Communities perceived full ownership of completed school infrastructure projects and members were satisfied with their schools' participation process. Most schools had realized their community participation goals. The CEC process was just one of the numerous ways the community participated in school infrastructure projects. The CEC participation method was largely working and realising its goals. More school development could be realised if the CEC participation process was further strengthened.

Keywords: *Community participation, headteachers, primary schools, somaliland, community education committees, education, public schools, infrastructure facilities, infrastructure projects.*

**Empowering the Church for the Management of Natural Resource-Conflicts: Case of
Africa Inland Church in Baringo County
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Abstract

The concept of natural resource-conflicts has caught the interest of scholars globally, however, there is no consensus on the determination of the drivers of these conflicts. For instance, some empirical studies have considered causes like negative ethnicity, political instigation, resource scarcity, climate change and finally, sociocultural factors. What is more intriguing and complex is natural resource-conflicts have taken place in both resource abundance and scarce periods. Religion plays a fundamental role in the society in fostering common brotherhood that goes beyond social boundaries like racial, ethnicity, culture and social status. In the sub-Saharan Africa religion floods all sectors of life, thus it is utterly difficult to be isolated from the religious web in all matters of life including: socio-political, environmental, and economic spheres. This study sought to determine the reasons for natural resource-based political conflicts in Baringo County, the factors that drive these conflicts, whether there is a linkage between the natural resource-based conflicts and the local conflicts in Baringo, and how the church could be involved in empowering the community to resolve these conflicts. This will be a mixed study; a standard will be used to collect data from the respondents, while an interview guide will be used to study the Focus Discussion Groups.

Keywords: *Empowering, church, management, natural resource-conflicts: Africa Inland Church, Baringo County*

The Influence of Information, Education and Communication on the Success of Human Rights Education School Programmes in Kenya

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Abstract

The aim of this study is to establish the influence of information, education and communication on the success of human rights education school programmes in Kenya. Human rights education has been upheld as one of the key measures set to enhance the human rights among the communities. Through Human Rights Education, awareness on human rights is created as well as ensuring every individual is at the forefront of observing, respecting, and advocating for the human rights. In the past two to three decades, there has been an emergence of human rights organizations at both international and local contexts. These organizations have come up with varied strategies of promoting the effectiveness of human rights education. One of these strategies is the use of Information Education and Communication in HRE school programmes. A sample survey research design was adopted. A sample size of 369 respondents was drawn from a population comprising of students, teachers and key informants from the human rights organizations in Kenya. A structured questionnaire and interview schedule was used to collect data for the study. Data was analysed using mixed method analysis. Results showed that some of the IEC strategies preferred included drama, videos, discussions and case studies. These methods were found to significantly influence the success of human rights education programmes in Kenyan secondary schools.

Keywords: *Information, education and communication, human rights education.*

Technical, Vocational Education and Training for Poverty Alleviation In the 21st Century: Challenges and Prospects for Kenya.

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Abstract

Kenya Vision 2030 is the country's development blue print aimed at making her a new industrializing middle income country providing high quality of life for all its citizens. Although Kenya has achieved economic development in various sectors, poverty still remains a problem in many areas. Technical, Vocational Training and Education (TVET) has been identified as a vehicle for strengthening the economic and social pillars of the vision through development of skills that will contribute to job creation and improvement of the livelihoods of the Kenyan people. In the context of the rural parts of Kenya, however, a gap exists in transforming the TVET skills into meaningful income generation due to, among other factors, limited information and communication technology (ICT) strategies. While various government initiatives such as financial support have been undertaken to close the skills acquisition gap by making TVET affordable to many Kenyan youths, more strategies are needed to enhance the relevance of the skills acquired and their subsequent absorption in order to alleviate poverty. This study explores the extent to which TVET and appropriate ICT strategies, coupled with access to information and knowledge, can raise the socio-economic status of the rural communities. The study used literature review, drawing comparison with sample success cases, to provide a comprehensive discussion. It concludes that TVET, appropriate ICT strategies and knowledge are essential for poverty alleviation.

Keywords: *Poverty alleviation, technical vocational education and training, information communication technology*

Influence of Training Practices on Job Satisfaction of Security Guards in Public Secondary Schools in Baringo County, Kenya

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Abstract

School security guards form a vital segment of the non-teaching staff in schools and play an important role in maintaining a safe and peaceful environment in learning institutions. Their main duty is to prevent crime from happening just by being present. Prioritizing their professional needs is, therefore, necessary to ensure that they fulfil their daily policing roles. The purpose of this study was to determine the influence of training on the job satisfaction of security guards in public secondary schools in Baringo County, Kenya. The scarcity of current literature necessitated this study since most studies on secondary schools focus on the teaching staff while the category of non-teaching staff especially school security guards has been largely neglected. The study was guided by the Analysis, Design, Develop, Implementation and Evaluation (ADDIE) Model. The study employed a cross-sectional descriptive survey research design and the target population comprised 508 school security guards and 169 principals in public secondary schools in Baringo County. Slovin's formula was used to get the sample of 224 security personnel. Random sampling technique was used to select 10% of the school principals to participate in the study. A questionnaire and an interview guide were used to collect data. These research tools were validated and tested for reliability. Cronbach Alpha was used to test reliability. Reliability of the instrument which was 0.831. This was above the 0.70 threshold of acceptable reliability. Qualitative data was analysed thematically based on the objectives. Quantitative data was collected and analysed using both descriptive (means, percentages as well as frequencies) and inferential statistics. The inferential statistics comprised Pearson product moment correlation and multiple linear regression. Results showed that training practices ($\beta_3 = 0.323$, $p < 0.05$) had a statistically significant influence on security guards' job satisfaction. Thus, training is a major predictor of job satisfaction. It is recommended that school boards of management should provide regular training for security guards to enhance their skills and enable them to be more productive.

Keywords: *Influence, training practices, job satisfaction, security personnel, public secondary schools, Baringo county, Kenya.*

Preservice Science Teachers' Adoption and Implementation of the Interactive Lecture Teaching Method

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Abstract

Studies conducted on the application of the lecture teaching method in science education show that teachers do not appropriately integrate interactive learning activities when they apply the lecture teaching method. This study delved into the preservice science teacher preparation for application of the Lecture Teaching Method. Data was collected from 107 participants at the onset and towards the end of a 14 week teaching practice (TP) using questionnaires, interviews and scores awarded during teaching practice supervision and assessment and analysed descriptively and inferentially. Descriptive analysis showed that the B.Ed science students faced difficulties in their attempt to implement particular instructional practices that constitute the Interactive Lecture Teaching Method. The t-tests showed an insignificant effect of teaching practice on the application of the method; however, performance on lesson development significantly improved, and Pearson correlation analysis showed a significant and moderate positive correlation between the interactive lecture approach and performance. Results of the second t-test and regression showed a significant improvement in performance.

Keywords: *Instructional practices, constructivism, lecture method, performance*

Mushroom Enterprise for Enhanced CBET Curriculum Implementation Rotich, E

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Abstract

The need for competence and practical skills development approach is gaining prominence in the Kenyan TVET institutions. RVIST being one such institution should therefore be a front line channel through which the CBET curriculum implementation can be actualized. Mushroom is an easy to grow fungus that can be mutually integrated with other farm enterprises thus enhancing Sustainable Agriculture. A mushroom produces spores in the gills found underneath the mushroom cap. The spores blown by winds and land on a suitable substrate such as wood or soil germinate to form a network of microscopic rooting threads (mycelium). Unlike the mushroom which pops up then disappears quickly, the mycelium persists, often for many years, extracting nutrients generating its annual crop of mushroom. It is this simple phenomenon that makes mushroom growing feasible in RVIST. Mushroom comes with a whole array of nutritional and health benefits. They can easily substitute Red meat as they have no cholesterol and are also rich in proteins and minerals. A mushroom enterprise whose market is still not flooded can be an option for self-employment for potential agro-entrepreneurs. The project therefore aims at starting a mushroom production unit in RVIST to facilitate training and learning and sustainable production of food for the community at a profit.

Keywords: *Mushroom, CBET, enterprise, TVET, occupational standards*

**An Investigation into the Challenges that Schools will be Facing in Implementing
Ministry of Health Guidelines on Covid 19 In Nakuru North Sub -County
Secondary Schools**

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Abstract

The ministry of education has been adversely affected by the covid 19 pandemic. With most of the students losing their academic calendar the ministry is trying to make up and compensate for the lost time thou efforts are being facing a myriad of challenges. Some of these challenges include; lack of adequate classrooms/ space, lack of running water and hand washing points, the students inability to observe social distance and put on the masks at all times. A sample of 15 schools was used in the study. Questionnaires were administered to principals and class teachers. Descriptive design was methodology of this study. Findings for the study indicate that 90% of the schools actually do not have adequate space to accommodate the students while maintaining the 1.5 metres .70% of the schools sampled also revealed that they lack adequate running water and hand washing points for the whole school population.60 % of the schools sampled the principals noted they had a challenge of the students not observing social distance at all time and the inability to properly put on the mask at all times. It means that the government needs to put raft measures to address these challenges. There is an urgent need to allocate funds to construct more classrooms. The government needs to also address the issue of water supply in schools, to ensure there is adequate running water for the students at all times. The principal and teachers need to enforce the rule on proper wearing of masks at all times and maintenance of social distance at all time by the students. The Government in collaboration with the ministry of health should be prepared for any emergencies to deal with any signs and symptoms.

Keywords: *Schools, health guidelines, covid 19, Nakuru North sub -county.*

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