



KIRINYAGA UNIVERSITY

5TH ANNUAL INTERNATIONAL VIRTUAL CONFERENCE, 2022

BOOK OF ABSTRACTS AND PROGRAMME

THEME

RE-ENGINEERING LEADERSHIP FOR SUSTAINABLE DEVELOPMENT

CONFERENCE DATES

MARCH 24-25, 2022

VENUE

VIRTUAL PLATFORM OF KIRINYAGA UNIVERSITY



KIRINYAGA UNIVERSITY

5TH ANNUAL INTERNATIONAL CONFERENCE

MARCH 24-25, 2022

THEME

RE-ENGINEERING LEADERSHIP FOR SUSTAINABLE DEVELOPMENT

SUB THEMES

1. Engineering, Science, Technology & Innovation
2. Biodiversity, Biorisk & Environmental Conservation
3. Natural Resources, Tourism & Climate Change
4. Education, Health, Agriculture & Food Security for Sustainable Development
5. Business, Economics, Entrepreneurship, Industry & Finance
6. Governance, Culture and Social economics for Societal Development.
7. Women, Gender, Children & Youth Empowerment

Email: conference2022@kyu.ac.ke

KyU is ISO 9001:2015 Certified



The 5th KyU Annual International Conference



KIRINYAGA UNIVERSITY

5TH ANNUAL INTERNATIONAL CONFERENCE, 2022

Book of Abstracts and Programme

Editors

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

Dr. Jotham M. Wasike, Ph. D

Dr. Agnes Mutiso, Ph. D

TABLE OF CONTENTS

DAY ONE: THURSDAY, MARCH 24, 2022.....	12
MORNING PARALLEL SESSIONS	13
AFTERNOON PARALLEL SESSIONS	18
DAY TWO: FRIDAY, MARCH 25, 2022.....	22
MORNING PARALLEL SESSIONS	23
MID MORNING PARALLEL SESSIONS	27
AFTERNOON PARALLEL SESSIONS	31
SUBTHEME: HEALTH & WELLNESS	35
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	35
Vitamin A Immunization Uptake, Awareness and Childhood Infections: A Case Study of Pregnant Women Visiting Antenatal Clinic at Kerugoya Hospital	36
Adherence to World Health Organization Guidelines on Prevention of Surgical Sites Infections among Nurses in Karatina Sub-county Hospital in Nyeri, Kenya.....	37
Estimation of Crop Water Requirements for Garden Pea, Sweet Pepper and Tomato using the CropWAT Model in Maragua Watershed, Murang'a County, Kenya	38
Determinants of Prostate Cancer Screening Uptake among Men Aged 40 Years and Above in Ruiru Sub County, Kenya	39
Health Facility Factors Influencing Secondary Prevention Practices Among Type 2 Diabetes Mellitus Patients in Meru County, Kenya: A Hospital Descriptive Correlational Study.....	40
Extent to which Visual Inspection with Acetic Acid Screening Guidelines are Adhered to in Selected Health Facilities in Embu County Kenya, Before and After Intervention.	41
Mathematical Modelling of Covid-19 and Diabetes Comorbidity under Vaccination	42
Role of Bone Morphogenetic Proteins (BMPs) and TGF-β Receptors in the Pathogenesis of Endometriosis	43
Prevalence of Wasting in Children Under Five Years Admitted at the Pediatric Ward in Kitale County Referral Hospital	45
Evaluation of the Determinants of Clinical Medicine Training Outcomes in Western Kenya.....	46
Factors Influencing High Child Mortality in Karemo Subcounty, Siaya County - Kenya	47
Socio-Cultural Barriers to Comprehensive Healthcare among the Elderly Population in Kenya.....	48

Challenges in the Management of Chronic Comorbid Conditions (Diabetes and Hypertension) in Kenya.....	49
Analysis of ADAM12 in the endometrium and ADAM12 Levels in Serum and Endocervical Mucus of Endometriosis	50
Examination of Rarely Disguised Features of Handwriting: Kirinyaga University, Kenya	51
Evaluation of Bacteriological Quality Status of Shallow Wells in Tharaka Nithi County, Kenya.....	52
Partograph Completion: A Comparison Between Faith-Based Mission Hospitals and County Public Teaching and Referral Hospitals in Upper Eastern, Kenya.	53
A 2-Year Retrospective Survey of Dog Bite Cases Reported at Narok County Referral Hospital, Kenya	54
Thin Layer Chromatographic Analysis of Commonly Abused Cough-Cold Medications	55
Resistance of <i>Anopheles gambiae</i> sensu lato to Pirimiphos-methyl Insecticide in Kakamega County, Highlands of Western Kenya	56
Influence of Anthropogenic Activities on Nyangongo Wetland Ecosystem in Nyaribari Chache Sub-County, Kisii County, Kenya.....	57
Membrane-Type 1 Matrix Metalloproteinase (MT1-MMP, MMP14) in Endocervical Mucus of Patients with and Without Endometriosis.	58
<i>Solanum nigrum</i> L. Show Anti-Obesity Effects on High-Fat Diet-Fed Sprague Dawley Rats in a Randomized Study.....	59
Curriculum Related Challenges for KRCHN – BSN Nurse at a Level 5 Hospital.....	60
SUB THEME: ENGINEERING, SCIENCE, TECHNOLOGY AND INNOVATION.....	61
Norm- Attainability of Generalized Finite Operators on C^* -Algebra	61
Library Programming: An Emerging Trend in Information Dissemination: The Case of Moi University, Nairobi Campus Library.	62
Factors Influencing Utilization of E-Resources in Academic Delivery: The Case of Multimedia University of Kenya	63
Development of Antiserum for Rapid Identification of <i>Erwinia</i> Spp. isolated from Star-of-Bethlehem (<i>Ornithogalum</i> Spp.) and its Control Using Actinomycetes.....	64
Assessing the Efficacy of Cost of Cloud Systems for Institutional Repository at Nyandarua National Polytechnics, Nyandarua County, Kenya.....	65
Establishment of the Currency Detector for the Visually Impaired	66
Towards A Framework for Managing Construction Project Labour Productivity in Kenya ..	67
On (P,Q)-Binomial Extension of Cox-Ross-Rubinstein Model for Optimization of Portfolio with Noisy Observations in Life Insurance.....	68

Spiral Micro-Structured FBG Hydrogen Sensor based on Pd87-Ni13/Pd4-Ag1 Thin Film and Femtosecond Laser Ablation.....	69
On Density in Norm-Attainable Classes	70
On Measure Preserving Transformations and Random Interlacements.....	71
Characterization of SnS / SnO ₂ : Sb P-N Junction For Solar Cell Applications	72
Arnold's Factorization Algorithm for Semi-Primes and the Crypt-analysis of RSA Cryptosystem	73
Characterization of Lower Semi-Continuous Functions In <i>Lp</i> -Spaces	74
Antimicrobial Activity of Mushroom (<i>Agaricus Bisporus</i>) and Fungi (<i>Trametes Gibbosa</i>) Extracts from Mushrooms and Fungi of Egerton Main Campus, Njoro Kenya.....	75
Subclasses of Analytic Functions Defined by Al-Oboudi Differential Operator Associated with Pascal Distribution Series	76
Trend of Construction Output Growth in Kenya:1977-2021.....	77
A Novel Covalently Bonded Amino-Silica for Capillary Ion Chromatography	78
Mathematical Modelling of Transmission and Re-Infection Dynamics for Covid-19 under Optimal Control Strategies	79
SUBTHEME: ICT, LIBRARY & INNOVATION	80
Characterization of Topological Points in Big Data Sets of Hausdorff Spaces	80
Named Entity Recognition Using Memory Based Learning Algorithms.....	81
Dynamical Analysis of Four-Species Food Web System with Prey Refuge and Holling Type III Functional Response.....	82
Of Virtual Libraries In-Service Delivery in Universities in Kenya	83
Use of Mobile Telecommunication Technologies in Access, Use, Transfer and Exchange of Agricultural Information among Small Scale Farmers in Rural Kenya, Ol'jorok Sub-County, Nyandarua County.....	84
Development of a Mobile Application for Community Health Workers.....	85
An Assessment of the Influence of Reverse Logistics Practices on Solid Waste Disposal Management in Kisumu Town, Kenya.....	86
The Need for Improved Computer Vision Based Techniques for Strawberry Fungal Leaf Disease Classification	87
Nanocomposites for Determination of Pollutants in Wastewater.....	88
Web Application Rental System of Farm-Machinery (MRAF)	89
Cloud Computing Usability Model for Quality University Education.....	90

Porous Carbons Derived from Lignin: Applications for Supercapacitors and Oxygen Reduction Electrocatalysts in Neutral Media	91
Secure Management of Encryption Keys for Small and Medium Enterprises in Africa: A Comparative Study	92
COVID-19 Forecast using Machine Learning Techniques	93
Legislative and Policy Regime on Information & Knowledge Sharing through indigenous Knowledge in Kenya: A Review of Literature	
	94
Assessment of Total Quality Management on Performance of Academic Library at Chuka University	95
Digital Technology in Managing Continuity for Sustainable Growth in Institutions of Higher Learning	96
Evaluation of AquaCrop Model in Wheat Production Under Zero and Conventional Tillage Practices in Laikipia, Kenya.....	97
Re-Engineering of Information Services through Partnerships and Collaborations in University Libraries: The Case of Moi University, Nairobi Campus Library and American Embassy, Kenya.....	98
A Review of Skills in Adoption of Big Data	99
SUBTHEME: ENGINEERING & TECHNOLOGY.....	100
A Review of Early Interventions for Creation of Interest in STEM Education	100
Design and Fabrication of Solar Powered Touchless Temperature Monitoring and Hand Sanitizing Device.....	101
Jatropha Curcas Oil Combustion in Internal Combustion Engines Under Oxy-Fuel Conditions: A Review	102
Impact of Karatina Sewer Stabilization Ponds on Biological and Physico-Chemical Properties of Water Along River Ragati in Nyeri County, Kenya	103
Mathematical Models for Predicting Solar Irradiance at a Site for Milk Solar Refrigeration Systems	104
Analysis of Urban Sprawl Patterns Around Eldoret Town Using Object Based Image Analysis.....	105
Influence of Land Size On Household Food Security in the Tea Zones of Kirinyaga County	106
Is there a Mismatch between Perceptions of Climate Change Variability and Adaptation Practices amongst Smallholder Farmers in Mount Kenya Region?	107

Genome-Wide Identification and Expression Profiling of Myb Transcription Factors in Radish (<i>Raphanus Sativus L</i>).....	108
Nematode Community Assemblage in Maize Agroecosystems: A Valuable Bioindicator Tool for Agro-Ecosystem Health	110
Sustainable Approaches for Community Involvement in the Conservation and Management of Dryland Forest and their Biodiversity: A Case of Kijege Forest, Tharaka Nithi County, Kenya.....	111
Influence of Rhizobium Inoculation and Phosphate Rock Fertilizer Application on Growth and Yield Components of Green gram in Tharaka-Nithi County, Kenya	112
Nematode Soil Food Web in Different Land Use Systems in Embu	113
Antimicrobial Activity of Mushroom (<i>Agaricus Bisporus</i>) and Fungi (<i>Trametes Gibbosa</i>) Extracts from Mushrooms and Fungi of Egerton Main Campus, Njoro Kenya.....	114
Real-time Monitoring of Water Quality in Lake Nakuru Using Telemetry	115
Assessment of Tomato Farming Strategies, Diseases Knowledge and Management Practices Among Farmers' in Kirinyaga County, Kenya	116
Occurrence of Fungal Foliar Diseases of Tomato in Different Agro-Ecological Zones of Kirinyaga County, Kenya	117
Rural Water Supply in the Era of Climate Change in Kenya; The case of Kapseret Sub County, Uasin Gishu County.....	118
Factors influencing Stormwater Utilization in Kapseret Sub-County, Uasin Gishu County, Kenya Addressing Challenges of.....	119
Application of Integrated Water Resources Management Principles in Urban Kenya: The Case of Kapsabet Town	120
SUB THEME: BUSINESS & ENTERPRENEURSHIP.....	121
Managerial Networking and Competitive Advantage: The Moderating Influence of Competitive Intensity	121
Tender Leaders Behind Bars- Smokescreens of the Self-Identity of Child Inmates in Borstal Institutions of Kenya.....	122
Job Satisfaction of School Security Guards in Baringo County	123
Influence of Access to Government Procurement Opportunities on Performance of Women-Owned Micro Enterprises in Kenya.....	124
Human Resource Practices and Organizational Citizenship Behavior Development	125
Balancing Natural Powers, Synthetic Powers for Societal Development: Female versus Male Powers interplay in a Man of the People, When the Sun Goes Down and Song of Malaya..	126
Leadership and Sustainable Development in Africa: Lessons from Traditional Yoruba Society	127

Servant Leadership and Organization Performance of Faith-Based Self Help Groups in Anglican Church of Kenya in Kirinyaga County, Kenya.....	128
Influence of Needs Identification on Implementation of Cash Transfer Programmes in Kapsoya Ward, Uasin Gishu County, Kenya.....	129
Factors That Promote Engagement in Entrepreneurship Among the Youth to Reduce Unemployment in Kenya	130
Credit Risk Management and Loan Performance of Non Deposit Taking Microfinance Institutions in Kenya: A Case Study of Kirinyaga County.....	131
Financial Uncertainty Indicators and Financial Performance of Manufacturing Firms in Kenya.....	132
Assessing the Influence of Talent Management Strategy on Job Satisfaction in the Lake Region Economic Bloc County Governments: A Case of Nyamira County, Kenya.....	133
Adjustment of Interest Rates, Demand for Credit and Economic Growth in Kenya	134
Client Appraisal and Loan Repayment Performance of Revolving Funds in Kenya	135
Innovation Orientation and the Performance of Insurance Companies in Kenya.....	136
Does Firm Size Have a Moderating Effect on the Influence of Financial Structure on Financial Performance of Listed Non-Financial Firms in Nairobi Securities Exchanges	137
Coaching Influences Service Delivery as a Key Management Development Practice in Public Universities in Kenya.....	138
Discursive Construction of Masculinities in Gender Based Violence (GbV) in Relation to Socio-Economic Status of Women in Kenya.....	139
Sustainable Performance Framework Indicators for Domestic Tourism in Kenya case of Nakuru, Nairobi and Mombasa Towns	140
Reward Management Practices and Employee Performance in Commercial Banks in Kenya.	141
Effect of Employee Resourcing on.....	142
Employee's Commitment in the Tele-Communication Industry in Kenya.....	142
Employee Welfare CSR Strategy and Performance of Public Universities in Kenya.....	143
Abstract	143
Influence of Leadership on the Performance of Faith-Based Hospitals in Kenya.	144
Influence of Market Structure on the Performance of Faith-Based Hospitals in Kenya.	145
Social Influence and Perceived Enjoyment: Predicting the Use of Mobile Payment Services Kenya.....	146
Measuring Human Resource Development Function for Sustainable Development.....	147
Credit Referencing and Loan Repayment in Kenya.....	148

Influence of Pricing as Market Segmentation Strategy on Performance of Fashion Merchandising Shops in Kenya	149
Nexus between Automation, Firm size and Performance of Initial Public Offering stocks at the Nairobi Securities Exchange in Kenya.....	150
Politeness Strategies Used by Kenya's Members of National Assembly	151
Custom Duty Incentives and Financial Performance of Manufacturing Firms in Kenya	152
Influence of Government Intervention Policy on Prison Population in Kenya	153
The Effect of Longer Account Payable Days and Shorter Account Receivable Days on The Profitability of Small Retail Businesses in Kirinyaga County.....	154
Implications of Physical Accessibility to Markets on Food and Nutrition Security in Agro Pastoral Tharaka Sub region, Kenya	155
Impact of Music on Fashion. A Case of Apparel Fashion Trends among East African Artists from 2010 To Date	156
Resources for Superior Organization Performance Case of Kirinyaga Technical Institute (KTI)	157
Evaluation of Training Programmes in Business Organizations.	158
Influence of Youth Enterprise Development Fund Sponsored Entrepreneurship Skills Training on the Growth of Entrepreneurial Youth Group Based Enterprises in Nairobi County, Kenya.	159
Effect of Exchange Rates on Trading Volume, Opening Prices and Closing Prices in Nairobi Securities Exchanges	160
Inflation Rate and Interest Rate Spread of Commercial Banks in Kenya.....	161
Impact of Tourism on the Economy of Rwanda:	162
Social Accounting Matrix (SAM) Analysis	162
SUBTHEME: EDUCATION & LEADERSHIP	163
Effect of Guidance and Counselling Teachers' Professional Qualifications on Implementation of Guidance and Counselling Services in Baringo Central Sub-County, Kenya.....	163
The Effectiveness of Blended Learning in Training Agriculture Using Dairy Delta Academy Platform	164
The Influence of Information, Education and Communication on the Success of Human Rights Education School Programmes in Kenya	165
Undergraduate E-Learning Programmes in the Health Professions: An Integrative Review of Evaluation Standards in Low- and Middle-Income Countries	166
Curbing Diarrhoea to Tame School Absenteeism Among Pupils in Nairobi Slums: Opportunities Stemming from Hand Washing as a Covid-19 Prevention Measure.....	167

Mathematics Education and Sustainable Development in Nigeria: A Systematic Review ...	168
The Relationship between the Teachers' Conduct and the Teachers' Performance in Public Primary Schools in Igembe North Sub-County, Meru County.....	169
Technology Enhanced Design Education Through the Use of Extended Reality Learning Environments.....	170
COVID - 19: Educational Setbacks, Lessons Learned and Way Forward for Kenya.....	171
Influence of Parental Ownership Strategies on the Management of Academic Performance in Secondary Schools in Imenti South Sub-County, Meru County, Kenya.....	172
Influence of Resources Used in Teaching English Speech Functional Writing Skills among Secondary School Learners in West Pokot County	173
ChallengesAffecting the Control of Examination Malpractices: A Case of Public and Private Universities in Kenya.....	174
Attitudes of Members of Tanzania Teachers Union (TTU) Towards the Effectiveness of their Union in Improving their Welfare at Dodoma City Council.	175
The Behaviour of Land Prices During the Road Planning and Development along (Greater) Eastern Bypass	176
The Susceptibility of Pupils to Sexual Abuse in Emesa Sub-Location, Kisii County-Kenya	177
Conference Organizing Committee.....	178

DAY ONE: THURSDAY, MARCH 24, 2022**Preliminaries**

- Conference Registration
- Familiarization with conference programme

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

Coordinator: Dr. Jotham M. Wasike

VENUE: VIRTUAL

TIME	ACTIVITY
8:30am - 8: 40 am	Welcoming Remarks- Deputy Vice Chancellor (ASA), Kirinyaga University Prof. Charles O. A. Omwandho, Ph.D
8: 40am - 9:00am	Opening Remarks - Vice Chancellor, Kirinyaga University - Prof. Mary Ndungu, Ph.D
9.00am - 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

SUB-THEME	HEALTH & WELLNESS
Chair	Dr. Immaculate Marwa
Rapporteur	Mr. Kenny Kamau

- 1) **Ambisi, A¹. & Ngari, D. M².**(¹Kirinyaga University , ²Chuka University) .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) **Mburu, S. & Makena, E.** (Kirinyaga University). Vitamin A Immunization Uptake, Awareness and Childhood Infections: A Case Study of Pregnant Women Visiting Antenatal Clinic at Kerugoya Hospital.
- 3) **Njau, S. K¹., Gakuanye, R.M².** (¹Kirinyaga University, ²Karatina Sub-County Hospital). Adherence to World Health Organization Guidelines on Prevention of Surgical Sites Infections among Nurses in Karatina Sub-County Hospital, Kenya.
- 4) **Ngari, M¹, Munzi, A. M.², Machwara, N³ , Njogu, W.⁴** (¹Karatina University,²Kirinyaga University, ³Kenyatta University, ⁴University of New South Wales, Australia) Health Facility Factors Influencing Secondary Prevention Practices among Type 2 Diabetes Mellitus Patients in Meru County, Kenya: A Hospital Descriptive Correlational Study
- 5) **Evah, M M¹, Abednego, O², Innocent, M³, Emmah, M⁴, Mary, M⁵.**(^{1,5}Kirinyaga University, ²Agakhan University, ³Kenyatta National Hospital, ⁴University of Nairobi). Extent to which Visual Inspection with Acetic Acid Screening Guidelines are Adhered to in Selected Health Facilities in Embu County Kenya, Before and After Intervention.
- 6) **Nderitu, K.W¹, Onyonka, E. M¹, Nyachieo, A²** (¹University of Nairobi, ²Institute of Primate Research, Kenya). Solanum nigrum L. Show Anti-Obesity Effects on High-Fat Diet-Fed Sprague Dawley Rats in a Randomized Study.

SUB-THEME	ENGINEERING & TECHNOLOGY
Chair	Eng. Moses Mwai
Rapporteur	Ms. Cynthia Ogali

- 1) **Murianka, S.O.** (Kirinyaga University). Towards A Framework for Managing Construction Project Labour Productivity in Kenya.
- 2) **Okinyi, D¹, Ombiro, J² 1Munji, M¹Njoroge, W.** (^{1,3}Kenyatta University, ²Maasai Mara University).Characterization of SnS / SnO₂: Sb P-N Junction for Solar Cell Applications.
- 3) **Kinuthia, H¹., Majale, C². Letema, S³** (^{1,2,3}Kenyatta University,¹Kirinyaga University, Kenya). The Behaviour of Land Prices During the Road Planning and Development along (Greater) Eastern Bypass.

SUB-THEME	NATURAL AND PHYSICAL SCIENCES
Chair	Dr. Peter Wanjohi
Rapporteur	Ms. Caroline Muthoni

- 1) **Amenya, C. S, Musundi , W. S, & Kirimi , J.** (Chuka University). Norm- Attainability of Generalized Finite Operators on C*-Algebra
- 2) **Waithaka, P. N¹, Gathuru, E. M², Githaga ,B. M³, Gacau, S. W.⁴** (¹ Kirinyaga University, ^{2,3,4}Egerton University). Development of Antiserum for Rapid Identification of *Erwinia* Spp. isolated from Star-of-Bethlehem (*Ornithogalum* Spp.) and its Control Using Actinomycetes.
- 3) **Mutuma, B^{1,2*}, Ndeye ,F. S¹, Amanda, B¹, Ndeye, M. N¹, Santoro, C³, Brilloni, A⁴, Poli, F⁴, Soavi, F⁴ Manyala, N¹** (¹ University of Pretoria, South Africa, ² Kirinyaga University, Kenya ³ University of Manchester, United Kingdom, ⁴Alma Mater Studiorum – Universita' di Bologna, Italy) .Porous Carbons Derived from Lignin: Applications for Super capacitors and Oxygen Reduction Electro catalysts in Neutral Media.

SUB- THEME	ICT, LIBRARY & INNOVATION
Chair	Dr. James Mwikya
Rapporteur	Mr. Francis Kamau

- 1) **Kariuki, P.** (Nyandarua National Polytechnic). Assessing the Efficacy of Cost of Cloud Systems for Institutional Repository at Nyandarua National **Polytechnics, Nyandarua County, Kenya.**
- 2) **Ongili , P. & Wasike , J.**(Kirinyaga University). Establishment of the Currency Detector for the Visually Impaired.
- 3) **Mukoma, C.** (Kenyatta University) Library Programming: An Emerging Trend in Information Dissemination: The Case of Moi University, Nairobi Campus Library.
- 4) **Diki, P. M.** (Meru University of Science and Technology) Factors Influencing Utilization of Library E-Resources in Academic Delivery: The Case of Multimedia University of Kenya.

SUB - THEME	AGRICULTURE & ENVIRONMENT
Chair	Dr. Victor Musau
Rapporteur	Ms. Lucy Kamau

- 1) **Kamau, J. W., Munyua, C. N. & Kamuru, S. M.** (Egerton University) Influence of Land Size On Household Food Security in the Tea Zones of Kirinyaga County.
- 2) **Maina, P., & Nzengya, D.** (St Pauls University, Limuru, Kenya). Is there a Mismatch between Perceptions of Climate Change Variability and Adaptation Practices amongst Smallholder Farmers in Mount Kenya Region?
- 3) **Muleke, E. M^{1*}, Yan, W^{1*}, Zhang, W.^{1*}, XU, L¹, Ying, J¹, Karanja, B¹, Zhu, X², Fan, L¹, Ahmadzai, Z¹, Liu, L¹.** (Nanjing Agricultural University, China, North Dakota State University, USA).Genome-Wide Identification and Expression Profiling of Myb Transcription Factors in Radish (*Raphanus Sativus L.*).
- 4) **Mwangi, M. W¹. Muiru, W.M²** (¹Nairobi Technical Training Institute, ²University of Nairobi). Prevalence of Nematode Genera and Trophic Groups Associated with Tomato Crop in Mwea West Sub-county, Kirinyaga County, Kenya.

- 5) **Chemutai, J, Daudi, F & Ngetich, J.K.** (University of Eldoret). Application of Integrated Water Resources Management Principles in Urban Kenya: The Case of Kapsabet Town.

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

- 1) **Mwendwa, A. M¹, Atambo, W². Bravo, M³. Atikiya, R⁴.** (^{1,2,3}Jomo Kenyatta University of Agriculture and Technology, ⁴Kenya Institute of Government). Managerial Networking and Competitive Advantage: The Moderating Influence of Competitive Intensity.
- 2) **Mukoba , D. A.** (Laikipia University) Tender Leaders Behind Bars- Smokescreens of the Self-Identity of Child Inmates in Borstal Institutions of Kenya.
- 3) **Chemwei, B¹., Koech, S. J².** (¹Kirinyaga University, ²Baringo County Assembly, Kenya). Job Satisfaction of School Security Guards in Baringo County.
- 4) **Munuya, C.** (Karatina University). Influence of Access to Government Procurement Opportunities on Performance of Women-Owned Micro Enterprises in Kenya.

SUB-THEME	BUSINESS & ENTREPRENEURSHIP (B)
Chair	Dr. Agnes Mutiso
Rapporteur	Ms. Joy Sarah

- 1) **Njoroge, D¹., Sabwami, P².** (¹Kirinyaga University, ²Garissa University, Kenya). Human Resource Practices and Organizational Citizenship Behavior Development.
- 2) **Ndungu, W. G¹, Kiuru, G.², Muchangi, D³**(Kirinyaga University, Kenya) Influence of Leadership on the Performance of Faith-Based Hospitals in Kenya.
- 3) **Balogun, O.A.** (Redeemers University, Nigeria). Leadership and Sustainable Development in Africa: Lessons from Traditional Yoruba Society.

- 4) **Mugure, R¹, Githira, C²** (¹Thika Technical Institute, ²KCA University, Kenya). Servant Leadership and Organization Performance of Faith-Based Self Help Groups in Anglican Church of Kenya in Kirinyaga County, Kenya.

SUB-THEME	EDUCATION & LEADERSHIP
Chair	Dr. Anne Muiru
Rapporteur	Mr. James Kamau

- 1) **Chemwei, B¹. Cheruiyot, G².** (¹Kirinyaga University, ²Teachers Service Commission, Kenya) Effect of Guidance and Counselling Teachers' Professional Qualifications on Implementation of Guidance and Counselling Services in Baringo Central Sub-County, Kenya.
- 2) **Yator, J, M. K. Kibet, M.K J. Marendich, J.** (The Eldoret National Polytechnic, Kenya) The Effectiveness of Blended Learning in Training Agriculture Using Dairy Delta Academy Platform.
- 3) **Juma, R.C. & Onyango, D.** (St. Augustine University of Tanzania). Attitudes of Members of Tanzania Teachers Union (TTU) Towards the Effectiveness of their Union in Improving their Welfare at Dodoma City Council.
- 4) **Mulongo, M, Njoka, J. & Kimosop, M.** (Karatina University, Kenya). Challenges Affecting the Control of Examination Malpractices: A Case of Public and Private Universities, Kenya.

AFTERNOON PARALLEL SESSIONS**2.00PM – 5.00PM**

SUB-THEME	HEALTH & WELLNESS
Chair	Prof . Laura Wangai
Rapporteur	Ms. Mercy Njuguna

- 1) **Mecha, E^{1,2}, Mwaura, A¹, Maoga, J¹, Makunja, R², Omwandho, C. A, O^{2,3}, Tinneberg, H¹, Konrad, L¹.** (1Justus-Liebig University, Giessen, Germany, ²University of Nairobi, ³Kirinyaga University). Role of Bone Morphogenetic Proteins (BMPs) and TGF- β Receptors in the Pathogenesis of Endometriosis.
- 2) **Alwora, A.** (Kirinyaga University, Kenya). Examination of Rarely Disguised Features of Handwriting: Kirinyaga University, Kenya
- 3) **Njeru, S. K, Kagoiyo, S, Webale, M.** (^{1,3}Kirinyaga University, ²Kirinyaga County Hospital-Kerugoya). Factors Influencing High Child Mortality in Karemo Sub county, Siaya County – Kenya
- 4) **Marwa, N. I¹. Mwita, B. M².** (¹Kirinyaga University,²University of Eastern Africa-Baraton). Socio-Cultural Barriers to Comprehensive Healthcare among the Elderly Population in Kenya
- 5) **Marwa, I¹, Mtshali, G²**(¹ Kirinyaga University, ²University of KwaZulu Natal-South Africa) Challenges in the Management of Chronic Comorbid Conditions (Diabetes and Hypertension) in Kenya

SUB-THEME	ENGINEERING& TECHNOLOGY
Chair	Eng. Emmanuel Mbusi
Rapporteur	Ms. Shirley Musima

- 1) **Mutonga, M¹, Kipkorir , E², Ngetich , W³** (¹ Kirinyaga University, ²Moi University, ³University of Eldoret, Kenya).Evaluation of Aqua Crop Model in Wheat Production Under Zero and Conventional Tillage Practices in Laikipia, Kenya.
- 2) **Ogari, A. N. &, Bosire, R. N.** (Kirinyaga University, Kenya). Jatropha Curcas Oil Combustion in Internal Combustion Engines Under Oxy-Fuel Conditions-A Review

- 3) **Wainaina, P. M.^{1,2}, Njue, M.R², Owino, G³**(^{1,2,3} Egerton University , ²Kirinyaga University, Kenya). Mathematical Models for Predicting Solar Irradiance at a Site for Milk Solar Refrigeration Systems.

SUB- THEME	NATURAL AND PHYSICAL SCIENCES
Chair	Dr. Geoffrey Muthoka
Rapporteur	Mr. Peter Muiru

- 1) **Zhou, X¹, Karanja, J. M.², Yang, M¹, Ming, X. Z.^{1,*}, Liu, K. ¹, Zhou, F.^{1,*},Dai, Y³**(¹Hubei University of Arts and Science, China, ²Kirinyaga University, ³Wuhan University of Technology, Wuhan, China). Spiral Micro-Structured FBG Hydrogen Sensor based on Pd₈₇-Ni₁₃/Pd₄-Ag₁ Thin Film and Femtosecond Laser Ablation.
- 2) **Owuor, J, Okelo, B , Owino , J, & Kinyanjui, J.** (Jaramogi Oginga Odinga University of Science and Technology). On Density in Norm-Attainable Classes.
- 3) **Okelo,B.** (Jaramogi Oginga Odinga University of Science and Technology). On Measure Preserving Transformations and Random Interlacements.

SUB-THEME	ICT, LIBRARY & INNOVATION
Chair	Dr. Josephat Karani
Rapporteur	Mr. Simon Gacheru

- 1) **Korir, P. & Wasike, J.** (Kirinyaga University). Web Application Rental System of Farm-Machinery(MRAF)
- 2) **Wasike, J. M¹., Wabwile, P. N².** (Kirinyaga University, Masinde Muliro University of Science and Technology). Cloud Computing Usability Model for Quality University Education.
- 3) **Ikuomola A. J.** (Olusegun Agagu University of Science and Technology, Nigeria.). Development of a Mobile Application for Community Health Workers.
- 4) **Kerre, D ,& Muchiri, H.** (Strathmore University). The Need for Improved Computer Vision Based Techniques for Strawberry Fungal Leaf Disease Classification.

SUB-THEME	
------------------	--

AGRICULTURE & ENVIRONMENT	
Chair	Dr. Brigit Mutuma
Rapporteur	Ms. Lydia Maina

- 1) **Maina, S. & Karuri, H.** (University of Embu). Nematode Community Assemblage in Maize Agroecosystems: A Valuable Bio Indicator Tool for Agro-Ecosystem Health.
- 2) **Kiria, E & Onundo, K.** (Chuka University, Kenya). Sustainable Approaches for Community Involvement in the Conservation and Management of Dryland Forest and their Biodiversity: A Case of Kijege Forest, Tharaka Nithi County, Kenya.
- 3) **Mbaka F. K, H. O. Nduku, H.O & Oloo-abucheli, G.O¹**(Chuka University, Kenya). Influence of *Rhizobium* Inoculation and Phosphate Rock Fertilizer Application on Growth and Yield Components of Green Gram in Tharaka-Nithi County, Kenya
- 4) **Karuri, H.** (University of Embu, Kenya). Nematode Soil Food Web in Different Land Use Systems in Embu.

SUB-THEME	BUSINESS & ENTERPRENEURSHIP (A)
Chair	Prof. Pius Odunga
Rapporteur	Ms. Zipporah Ndirangu

- 1) **Kisirkoi, S.** (Maasai Mara University, Kenya) Factors that Promote Engagement in Entrepreneurship among the Youth to Reduce Unemployment in Kenya.
- 2) **Maina, J., & Muigai, R. G.** (Kirinyaga University, Kenya). Credit Risk Management and Loan Performance of Non Deposit Taking Microfinance Institutions in Kenya: A Case Study of Kirinyaga County.
- 3) **Pila, J, Muturi, W,& Olweny, T.** (Jomo Kenyatta University of Agriculture and Technology, Kenya). Financial Uncertainty Indicators and Financial Performance of Manufacturing Firms in Kenya.
- 4) **Omosa, J, Mwangi, G Mwangi, C, Muriithi, R.** (Murang'a University of Technology, Kenya).Management Strategy on Job Satisfaction in the Lake Region Economic Bloc County Governments: A Case of Nyamira County, Kenya.

SUB-THEME	ENTREPRENEURSHIP AND STRATEGIC BUSINESS(B)
Chair	Dr. David Njoroge
Rapporteur	Mr. Douglas Mwirigi

- 1) **Murithi, K. & Waweru, G.** (Kirinyaga University, Kenya) Adjustment of Interest Rates, Demand for Credit and Economic Growth in Kenya.
- 2) **Kinyua, W. J, Kiiru, G, & Njoroge, D** (Kirinyaga University, Kenya). Client Appraisal and Loan Repayment Performance of Revolving Funds in Kenya.
- 3) **Njuguna, W, Kabata, D, & Wambugu, H.** (Kirinyaga University, Kenya). Innovation Orientation and the Performance of Insurance Companies in Kenya.
- 4) **Mweu , T, Kipkirui ,D. K Nyakina ,A. K & Githira, C.** (KCA University, Kenya) .Does Firm Size Have a Moderating Effect on the Influence of Financial Structure on Financial Performance of Listed Non-Financial Firms in Nairobi Securities Exchanges.

SUB-THEME	EDUCATION & LEADERSHIP
Chair	Dr. Bernard Chemwei
Rapporteur	Mr Dennis Kanyangi

- 1) **Mutua, M.** (University of the Free State, South Africa). Undergraduate E-Learning Programmes in the Health Professions: An Integrative Review of Evaluation Standards in Low- and Middle-Income Countries.
- 2) **Ogeto, P. M. & Mokua P.M.** (Laikipia University, Kenya, Kisii University, Kenya). Curbing Diarrhoea to Tame School Absenteeism Among Pupils in Nairobi Slums: Opportunities Stemming from Hand Washing as a Covid-19 Prevention Measure.
- 3) **Muriuki, J. N.** (University of Nairobi, Kenya). 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.

DAY TWO: FRIDAY, MARCH 25, 2022

- Registration
- Announcements

Coordinator: Dr. Agnes N. Mutiso

VENUE: VIRTUAL

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

MORNING PARALLEL SESSIONS**9.00 AM - 10.30AM**

SUB-THEME	HEALTH & WELLNESS
Chair	Dr. Mary Murigi
Rapporteur	Ms. Evah Maina

- 1) **Chabari, K. S. & Ogolla, F.** (Chuka University, Kenya). Evaluation of Bacteriological Quality Status of Shallow Wells in Tharaka Nithi County, Kenya.
- 2) **Barasa, S¹, Miriti, A¹, Silas, P¹, Murigi, M², Munyalo, B³, Maithya, R³, Jebet, J⁴, Shikuku, D⁵.** (¹Kenya Medical Training College, ²Kirinyaga University, ³Amref International University, ⁴University of Nairobi, Kenya, ⁵Liverpool School of Tropical Medicine). Partograph Completion: A Comparison Between Faith-Based Mission Hospitals and County Public Teaching and Referral Hospitals in Upper Eastern, Kenya.
- 3) **Chepkoech, J, & Oduori, D.O.** (Maasai Mara University, Kenya). A 2-Year Retrospective Survey of Dog Bite Cases Reported at Narok County Referral Hospital, Kenya.
- 4) **Ogechi, B, Ngetich, J. & Kiplagat, A.** (University of Eldoret, Kenya). Influence of Anthropogenic Activities on Nyangongo Wetland Ecosystem in Nyaribari Chache Sub-County, Kisii County, Kenya.
- 5) **Maoga, J¹, Muhammad, A. R¹, Mecha, E^{1,3}, Mwaura, A¹, Omwandho, C, O.A^{3,4}, Scheiner-Bobis, G² Konrad, L¹(^{1,2}Justus-Liebig University, Giessen, Germany, ³University of Nairobi, ⁴Kirinyaga University, Kenya).Membrane-Type 1 Matrix Metalloproteinase (MT1-MMP, MMP14) in Endocervical Mucus of Patients with and Without Endometriosis.**

SUB-THEME	ENGINEERING& TECHNOLOGY
Chair	Eng. Senteu Ole Murianka
Rapporteur	Eng. Lorrian Mbabu

- 1) **Gachoki, N, Musima, S, L.Mbabu, L , & Mwai, M.** (Kirinyaga University, Kenya). A Review of Early Interventions for Creation of Interest in STEM Education.

- 2) **Mwai, M¹, Gichane, M², Thimo, L³, Mwai, A⁴ Sirengo, H⁵** (¹Kirinyaga University, ^{2,4}Dedan Kimathi University, ⁵Starehe Girls Center.) Design and Fabrication of a Solar Powered Touchless Temperature Monitoring and Hand Sanitizing Device.

SUB-THEME	NATURAL AND PHYSICAL SCIENCES
Chair	Dr. Joseph Muna
Rapporteur	Ms. Caroline Kimotho

- 1) **Asamba, S. O *, Obogi, R * Okelo, B.**(¹Kisii University,²Jaramogi Oginga Odinga University of Science and Technology) .Characterization Of Lower Semi-Continuous Functions in L^P -Spaces.
- 2) **Waithaka, P. N.¹, Gathura, E. M², Githaiga, B. M³ , Onkoba, K. M⁴.** (¹Kirinyaga University, ^{2,3,4}Egerton University). Antimicrobial Activity of Mushroom (*Agaricus Bisporus*) and Fungi (*Trametes Gibbosa*) Extracts from Mushrooms and Fungi of Egerton Main Campus, Njoro Kenya.
- 3) **Oyekan, E.A.** (Olusegun Agagu University of Science and Technology, Nigeria). Subclasses of Analytic Functions Defined by Al-Oboudi Differential Operator Associated with Pascal Distribution Series.

SUB-THEME	ICT, LIBRARY AND INNOVATION
Chair	Dr. Ephantus Mwangi
Rapporteur	Mr Simon Gacheru

- 1) **Kamau , F^{1,2}, Wasike, J².** (^{1,2}Jomo Kenyatta University of Science and Technology, ²Kirinyaga University) Named Entity Recognition Using Memory Based Learning Algorithms.
- 2) **Kamau, G¹., Ndinda, M².** (¹Chuka University, ²Egerton University). Of Virtual Libraries In-Service Delivery in Universities in Kenya.
- 3) **Kimani, H¹, Minishi-Majanja, M.K** (University of South Africa). Use of Mobile Telecommunication Technologies in Access, Use, Transfer and Exchange of Agricultural Information among Small Scale Farmers in Rural Kenya, Ol'jorok Sub-County, Nyandarua County.

SUB-THEME	AGRICULTURE & ENVIRONMENT
Chair	Dr. Mariah Onditi
Rapporteur	Ms Beatrice Wairimu

- 1) **Biwott, C., G.C, Kiplagat, A& Ngetich, J.K.** (University of Eldoret). Addressing Challenges of Rural Water Supply in the Era of Climate Change in Kenya; The Case of Kapseret Sub County, Uasin Gishu County.
- 2) **Biwott, G.C, Kiplagat, A & Ngetich, J.K.** (University of Eldoret). Factors Influencing Stormwater Utilization in Kapseret Sub-County, Uasin Gishu County, Kenya.
- 3) **Mwandiki, M, C, Gichumbi, J.M, Kiruki, S, & Ogolla, F. O⁴**(Chuka University, Kenya). Impact of Karatina Sewer Stabilization Ponds on Biological and Physico-Chemical Properties of Water along River Ragati in Nyeri County, Kenya.
- 4) **Nyangoto, D.M. B.** (Nairobi Technical Training Institute). Ecohydrologic Effects of Shade Trees Spacing on Soil Characteristics Affecting Tea Yields: A Case Study of Moniere Estate in Kipkebe of Sotik Sub-County.
- 5) **Odhiambo, F, Aminer, T., Okelo, B & Manyala, J.** (Jaramogi Oginga Odinga University of Science and Technology). Dynamical Analysis of Four-Species Food Web System with Prey Refuge and Holling Type III Functional Response.

SUB-THEME	BUSINESS & ENTERPRENEURSHIP (A)
Chair	Dr. Dennis Muchangi
Rapporteur	Dr. Susan Nkanata

- 1) **Onsongo, E. N.** (Kisii University, Kenya). Coaching Influences Service Delivery as a Key Management Development Practice in Public Universities in Kenya.
- 2) **Gitu, P. M.** (Laikipia University, Kenya). Discursive Construction of Masculinities in Gender Based Violence (GBV) in Relation to Socio-Economic Status of Women in Kenya.
- 3) **Karuri, E.** (Kenyatta University, Kenya). Reward Management Practices and Employee Performance in Commercial Banks in Kenya.
- 4) **Maina, E.** (Kirinyaga University). Effect of Employee Resourcing on Employee's Commitment in the Tele-Communication Industry in Kenya.
- 5) **Kinyanjui, J.** (Kirinyaga University, Kenya). Employee Welfare CSR Strategy and Performance of Public Universities in Kenya.

SUB-THEME	BUSINESS & ENTERPRENEURSHIP(B)
Chair	Dr. Gitau Muigai
Rapporteur	Ms. Zipporah Ndirangu

- 1) **Ndungu, W. G¹, Kiiru, G, ², Muchangi, D³**(Kirinyaga University, Kenya). Influence of Market Structure on the Performance of Faith-Based Hospitals in Kenya.
- 2) **Kabata, D.** (Kirinyaga University, Kenya). Social Influence and Perceived Enjoyment: Predicting the Use of Mobile Payment Services Kenya.
- 3) **Kiruja, E.** (Technical University of Kenya). Measuring Human Resource Development Function for Sustainable Development.
- 4) **Muigai, R. G¹., Wamweya, E².** (¹Kirinyaga University, ²Jomo Kenyatta University of Agriculture & Technology). Credit Referencing and Loan Repayment in Kenya.

SUB-THEME	EDUCATION & LEADERSHIP
Chair	Dr Bernard Chemwei
Rapporteur	Ms. Grace Chomba

- 1) **Lawal, R. F. & Dada, F. H.** (Federal College of Education, Nigeria). Mathematics Education and Sustainable Development in Nigeria: A Systematic Review.
- 2) **Gitonga, H., Karamana, K. T & Gichohi, P. M** (Kenya Methodist University, Kenya) The Relationship between the Teachers' Conduct and the Teachers' Performance in Public Primary Schools in Igembe North Sub-County, Meru County.
- 3) **Ndunda, H. K¹, Lilechi, V. W²** (¹Kirinyaga University, ²Kenyatta University, Kenya) Technology Enhanced Design Education Through the Use of Extended Reality Learning Environments.
- 4) **Muhia, P. M.** (Laikipia University, Kenya). Balancing Natural Powers, Synthetic Powers for Societal Development: Female versus Male Powers interplay in a Man of the People, When the Sun Goes Down and Song of Malaya.

MID MORNING PARALLEL SESSIONS

10.30AM - 1.00PM

SUB-THEME	HEALTH & WELLNESS
Chair	Dr. David Nderu
Rapporteur	Ms Angela Alwora

- 1) **Mureithi, M¹, K'Odhambo, M. O², Mureithi, J³, Murigi, M⁴** (^{1,2,3}Kenyatta University, ⁴Kirinyaga University). Determinants of Prostate Cancer Screening Uptake Among Men Aged 40 Years and Above in Ruiru Sub County, Kenya.
- 2) **Adongo, F. A., Amin, T., Okelo, B. & Onyango, B.** (Jaramogi Oginga Odinga University of Science and Technology). Mathematical Modelling of Covid-19 and Diabetes Comorbidity Under Vaccination.
- 3) **Kitungulu, N^{1,2}, Guyah, B¹, Webale, M³, Shaviya, N⁴, Machani, M⁵, Mulama, D², Ndenga, B⁵, Tarus, J²** (¹Maseno University, ²Masinde Muliro University of Science and Technology, Department of Biological Sciences. ³Kirinyaga University, ⁴Masinde Muliro University of Science and Technology). Resistance of *Anopheles gambiae* sensu lato to Pirimiphos-methyl Insecticide in Kakamega County, Highlands of Western Kenya.
- 4) **Kamau, S.M. & Mwangi, J. H.** (Kirinyaga University). Curriculum Related Challenges for KRCHN – BSN Nurse at Level 5 Hospital.

SUB-THEME	ENGINEERING & TECHNOLOGY
Chair	Eng. Rodgers Bosire
Rapporteur	Eng. Vincent Ngeno

- 1) **Mbusi, E.** (Kirinyaga University). Trend of Construction Output Growth in Kenya:1977-2021.
- 2) **Oyier, I. L., Nyagol, M, & Odaya, A.** (Jaramogi Oginga Odinga University of Science & Techonology). An Assessment of the Influence of Reverse Logistics Practices on Solid Waste Disposal Management in Kisumu Town, Kenya.
- 3) **Odhiambo, S, Mwasi, B & Ngetich, J.** (University of Eldoret). Analysis of Urban Sprawl Patterns around Eldoret Town Using Object Based Image Analysis.

SUB-THEME	NATURAL & PHYSICAL SCIENCES
Chair	Dr Paul Waithaka
Rapporteur	Mr Nathan Musembi

- 1) **Oburu, J, Nyakinda, J*, Were, J,& Oduor, B.** (Jaramogi Oginga Odinga University of Science and Technology). On (P,Q)-Binomial Extension of Cox-Ross-Rubinstein Model for Optimization of Portfolio with Noisy Observations in Life Insurance.
- 2) **Maina, E.** (Kirinyaga University). A Novel Covalently Bonded Amino-Silica for Capillary Ion Chromatography.
- 3) **Mailu, S.** (Machakos University). Nanocomposites for Determination of Pollutants in Waste Water.

SUB- THEME	ICT, LIBRARY & INNOVATION
Chair	Dr. Agatha Wagutu
Rapporteur	Mr. Harrison Karani

- 1) **Mwikya, J¹ , Karani, J², Obura, J³.**(^{1,2}Kirinyaga University, ²Bomet University College, Kenya). Secure Management of Encryption Keys for Small and Medium Enterprises in Africa: A Comparative Study.
- 2) **Kirori, Z. & Ireri, E.** (Jomo Kenyatta University of Agriculture and Technology, Kenya) COVID-19 Forecast using Machine Learning Techniques.
- 3) **Maina, S.** (Kirinyaga University, Kenya) Legislative and Policy Regime on Information & Knowledge Sharing through indigenous Knowledge in Kenya: A Review of Literature.

SUB-THEME	AGRICULTURE & ENVIRONMENT
Chair	Dr. Dickson Kinyua
Rapporteur	Ms Beatrice Wairimu

- 1) **Kipkemboi, J. K.¹, Manene F. M.², Rotich, S. K.³, Nyamu J.K.⁴ Omengo, F.⁵**(¹Kaimosi University College, ²Egerton University, ³Moi University, ⁴Kirinyaga University, ⁵Kenya Wildlife Service.) Real-Time Monitoring of Water Quality in Lake Nakuru Using Telemetry
- 2) **Ogallo, F^{1*}, Onyango, B², Muraya, M³**(¹Chuka University, ^{2,3}Jaramogi Oginga Odinga University of Science and Technology, Kenya).Assessment of Tomato Farming Strategies, Diseases Knowledge and Management Practices Among Farmers' in Kirinyaga County, Kenya.
- 3) **Ogolla, O. F¹, Muraya M. M², Onyango O. B³**(¹Chuka University ^{2,3}Jaramogi Oginga Odinga University of Science and Technology , Kenya). Occurrence of Fungal Foliar Diseases of Tomato in Different Agro-Ecological Zones of Kirinyaga County, Kenya.
- 4) **Maingi, S, Ndiiri, J. & Mati, B.** (Jomo Kenyatta University of Agriculture and Technology, Kenya).Estimation of Crop Water Requirements for Garden Pea, Sweet Pepper and Tomato using the CropWAT Model in Maragua Watershed, Murang'a County, Kenya.

SUB-THEME	BUSINESS & ENTREPRENEURSHIP (A)
Chair	Dr. David Kabata
Rapporteur	Mr. Douglas Mwirigi

- 1) **Orangi, A. K. & Chomba, G.** (Kirinyaga University, Kenya). Influence of Pricing as Market Segmentation Strategy on Performance of Fashion Merchandising Shops in Kenya.
- 2) **Okumu, A. B., Olweny, T¹, Muturi, W.** (Jomo Kenyatta University of Agriculture and Technology, Kenya) .Nexus between Automation, Firm size and Performance of Initial Public Offering stocks at the Nairobi Securities Exchange in Kenya.
- 3) **Irei, H. K. & Njuki, E.** (Chuka University, Kenya).Politeness Strategies Used by Kenya's Members of National Assembly.

- 4) Odunga, P¹, Odunga, P²(¹Kirinyaga University, ²Moi University, Kenya)**
Impact of Tourism on the Economy of Rwanda: Social Accounting Matrix (SAM) Analysis.

SUB- THEME	BUSINESS & ENTREPRENEURSHIP (B)
Chair	Dr Stephen Kamau
Rappertour	Ms Violet Njeru

- 1) Kinoti K.** (Chuka University, Kenya) Implications of Physical Accessibility to Markets on Food and Nutrition Security in Agro Pastoral Tharaka Sub region, Kenya.
- 2) Kimemia, M.** (Kirinyaga University, Kenya) Impact of Music on Fashion. A Case of Apparel Fashion Trends among East African Artists from 2010 To-Date.
- 3) Gachichio, M.** (Kirinyaga University, Kenya). Resources for Superior Organization Performance Case of Kirinyaga Technical Institute (KTI).
- 4) Maina, M. W. & Mutiso, A. N.** (Kirinyaga University). Inflation Rate and Interest Rate Spread of Commercial Banks in Kenya.

SUB-THEME	EDUCATION & LEADERSHIP
Chair	Dr. Grace Kiiru
Rapporteur	Mr Dennis Kanyingi

- 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) Muiru, 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.

AFTERNOON PARALLEL SESSIONS**2.00PM – 5.00PM**

SUB-THEME	HEALTH & WELLNESS
Chair	Dr. Samuel Mburu
Rapporteur	Mr. Geoffrey Obondi

- 1) **Njeru, K, Kagoiyo, S., Gachangi, J. N, Muthui, G.**(¹Kirinyaga University, ²Kirinyaga County Referral Hospital, ^{3,4}Jomo Kenyatta University of Agriculture and Technology).Prevalence of Wasting in Children Under Five Years Admitted at the Pediatric Ward in Kitale County Referral Hospital.
- 2) **Njeru, S.K, Adoka, S.O. & Onguru, D.** (Jaramogi Oginga Odinga University of Science and Technology). Evaluation of the Determinants of Clinical Medicine Training Outcomes in Western Kenya.
- 3) **Mwaura, A.N ¹, Scheiner-Bobis, G², Maoga, J¹, Mecha, E³, Omwandho, C.O.A ^{3,4}, Riaz, M.A ¹, Konrad, L¹(^{1,2}Justus-Liebig University, Giessen, Germany ¹, University of Nairobi, Kenya³ , Kirinyaga University, Kenya⁴). Analysis of ADAM12 in the Endometrium and ADAM12 levels in Serum and Endocervical Mucus of Endometriosis**
- 4) **Obondi, G. O.** (Kirinyaga University, Kenya). Thin Layer Chromatographic Analysis of Commonly Abused Cough-Cold Medications.

SUB-THEME	NATURAL AND PHYSICAL SCIENCES
Chair	Dr. Joseph Esekoni
Rapporteur	Mr. Nathan Musembi

- 1) **Oyaro, A. & Omolo, R.** (Jaramogi Oginga Odinga University of Science and Technology). Arnold's Factorization Algorithm for Semi-Primes and the Crypt-analysis of RSA Cryptosystem.
- 2) **Musili, M.F, Okelo, B, Ongati, O, & Magwanga, R.** (Jaramogi Oginga Odinga University of Science and Technology). Mathematical Modelling of Transmission and Re-Infection Dynamics for Covid-19 under Optimal Control Strategies.

- 3) **Onyango, O., A Okelo , B & Omollo, R.** (Jaramogi Oginga Odinga University of Science& Technology). Characterization of Topological Points in Big Data Sets of Hausdorff Spaces.

SUB-THEME	ICT, LIBRARY AND INFORMATION
Chair	Dr. James Mwikya
Rapporteur	Ms. Irene Mwangi

- 1) **Kamau, G. & Wasike , J.** (Chuka University, Kirinyaga University, Kenya). Assessment of Total Quality Management on Performance of Academic Library at Chuka University.
- 2) **¹Ngereki, A. M. ²Ngorobi G, W** (Chuka University, Kirinyaga University, Kenya). Digital Technology in Managing Continuity for Sustainable Growth in Institutions of Higher Learning.
- 3) **Mukoma, C¹. Mwai-Okeyo. E², Kiplang'at, J³.** (Moi University, Kenyatta University, Africa International University, Kenya). Re-Engineering of Information Services through Partnerships and Collaborations in University Libraries: The Case of Moi University, Nairobi Campus Library and American Embassy, Kenya.
- 4) **Kamau, F.,& Wasike, J.** (Kirinyaga University, Kenya). Adoption of Big Data: A Review.

SUB-THEME	ENTREPRENEURSHIP AND STRATEGIC BUSINESS (A)
Chair	Dr. Evelyn Maina
Rapporteur	Mr Kenneth Mureithi

- 1) **Mwangi, G*, & Gitau, R.** (Kirinyaga University, Kenya) Custom Duty Incentives and Financial Performance of Manufacturing Firms in Kenya.
- 2) **Mosoti, D.** (Chuka County). Influence of Government Intervention Policy on Prison Population in Kenya.
- 3) **Mwirigi, D, & Mutiso, A.** (Kirinyaga University, Kenya). The Effect of Longer Account Payable Days and Shorter Account Receivable Days on The Profitability of Small Retail Businesses in Kirinyaga County.

- 4) **Kairu, R , Wanjiku, C.V, Gloria, C, Mwangi, P, & Githira, C.** (University of Embu). Effect of Exchange Rates on Trading Volume, Opening Prices and Closing Prices in Nairobi Securities Exchanges.
- 5) **Omosa, J., Mwangi, G. Mwangi, C. & Muriithi, R.** (Murang'a University of Technology, Kenya). Assessing the Influence of Talent Management Strategy on Job Satisfaction in the Lake Region Economic Bloc County Governments: A Case of Nyamira County, Kenya.

SUB-THEME	BUSINESS & ENTREPRENEURSHIP (B)
Chair	Dr. Mark Waita
Rapporteur	Mr. Gabriel Waweru

- 1) **^Omare, M, Kambaga, D².** (¹Kisii University, ²Technical University of Kenya, Kenya). Sustainable Performance Framework Indicators for Domestic Tourism in Kenya: Case of Nakuru, Nairobi and Mombasa Towns.
- 2) **Murei, R*, Kiprop, V. & Rotich, D.** (Eldoret National Polytechnic, Kenya). Influence of Needs Identification on Implementation of Cash Transfer Programmes in Kapsoya Ward, Uasin Gishu County.
- 3) **Kamau, S.** (Kirinyaga University, Kenya). Evaluation of Training Programmes in Business Organizations.
- 4) **Gathitu, C. W¹, Mukulu, E² , John Kihoro. J².** (^{1,2}Jomo Kenyatta University of Agriculture and Technology (JKUAT), ²Cooperative University of College of Kenya, Kenya). Influence of Youth Enterprise Development Fund Sponsored Entrepreneurship Skills Training on the Growth of Entrepreneurial Youth Group Based Enterprises in Nairobi County, Kenya.

SUB-THEME	EDUCATION & LEADERSHIP
Chair	Dr. Sophia Njeru
Rapporteur	Mr. James Kamau

- 1) **Ngumbi, E¹., Wasike, J.M².** (¹Catholic University of Eastern Africa, ²Kirinyaga University, Kenya). COVID – 19: Educational Setbacks, Lessons Learned and Way Forward for Kenya.
- 2) **Muiru, A.** (Kirinyaga University, Kenya). Influence of Parental Ownership Strategies on the Management of Academic Performance in Secondary Schools in Imenti South Sub-County, Meru County, Kenya.

- 3) **Koross, B.** T. (Turkana University College, Kenya). Influence of Resources used in Teaching English Speech Functional Writing Skills among Secondary School Learners in West Pokot County.
- 4) **Amadi, O.** J. (Maasai Mara University, Kenya). The Susceptibility of Pupils to Sexual Abuse in Emesa Sub-Location, Kisii County-Kenya

END OF CONFERENCE, 2022

SUBTHEME: HEALTH & WELLNESS

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

Ambisi A¹., Mugambi, D.N².

¹Kirinyaga University, Kenya,²Chuka University, Kenya

Correspondence : annahmbisi@gmail.com

Abstract

Diabetes is a chronic metabolic disorder characterized by hyperglycemia with disturbances of carbohydrates, fat and protein metabolism. It affects millions of people globally every day and prevalence on the rise due to unhealthy diet and lifestyles. It is associated with chronic complications including cardiovascular diseases, diabetic nephropathy, diabetic neuropathy, foot ulcers and diabetic eye diseases that are all preventable through secondary preventive measures. Once an individual has been diagnosed with T2DM, secondary preventive approaches are essential in preventing the occurrence of chronic complications. However, lack of awareness has been cited as a common reason for the development of complications. This study assessed the effect of social cultural and economic factors on secondary diabetes prevention among patients with Type 2 Diabetes Mellitus (T2DM) at Consolata Hospital Nkubu and Meru Level Five Hospital between March and April 2019. A descriptive correlational study design was adopted to collect data from 357 purposively sampled participants with T2DM using questionnaires and Focus Group Discussion Guide. Quantitative data 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. 31.6% had secondary level of education and 67% were employed. 70.6% did foot examination on every visit, 65% BP monitoring 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 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*

Vitamin A Immunization Uptake, Awareness and Childhood Infections: A Case Study of Pregnant Women Visiting Antenatal Clinic at Kerugoya Hospital

Mburu , S.¹,Makena, E.²

Kirinyaga University, Kenya

Correspondence: swmburu@gmail.com

Abstract

Vitamin A is essential for growth, development, cell recognition, vision immune function and reproduction. Its deficiency results in Vitamin A deficiency disorders, which include severe infections in infants and Post-partum mothers and is a major cause of childhood mortality. Consequently, the Government of Kenya has included it as one of the Vaccinations given at no cost, under the Kenya Expanded Programme on Immunization (KEPI) to newborns, infants and children at 6, 12, 18, 24, 30, 36, 42, 48, 54 as well as 60 months. Vitamin A supplementation is also given in the same program to less than 6 weeks' Post-partum mothers, to boost their immunity and prevent severe infections. This study is examined the uptake or lack thereof, of the immunization and awareness in women at Kerugoya County Referral Hospital. In particular, pregnant women attending antenatal clinic were randomly selected to respond to a questionnaire. The data collected was analyzed using descriptive Statistics. Although 65.5% of the women had heard of the Vitamin A immunization, only 39% had given their children at least one dose. Additionally, 63.4% of the women did not know the importance of the Vitamin A to their Children or themselves. 61% of the women did not see the need for the Vitamin A Immunization, which tallied with those who did not know its importance. However, majority of the women reported Health Care Facilities as their source of information. This could be leveraged by integrating more information on the Vitamin A Immunization Antenatal clinics. There might be an association or link between this lack of knowledge of the importance of the crucial immunization with severe infections in Children or Post-partum mothers at Kerugoya County Referral Hospital, which need to be investigated in a more robust Longitudinal Study Design.

Keyword: *Vitamin A, Vitamin A Deficiency Disorders, Childhood Severe Infections, Post-partum Infections*

Adherence to World Health Organization Guidelines on Prevention of Surgical Sites Infections among Nurses in Karatina Sub-county Hospital in Nyeri, Kenya

Njau, S.K¹, Gakuanye, R.M.²

¹Kirinyaga University, Kenya, ²Karatina Sub County Hospital, Kenya

Correspondence: snjau@kyu.ac.ke

Abstract

Surgical Site Infections (SSI) are a major source of morbidity and associated mortalities. The invasive nature of the procedures, break the first line of defense for the body, making the patient vulnerable to infections especially by pathogens such as Escherichia coli, staphylococcus aureus, and klebsiella. The levels of the morbidities have not had a significant decline, since the inception of WHO blueprints on prevention. This study assessed adherence to WHO blueprints on the prevention of SSIs among nurses and to establish the nurse-linked as well as facility-associated factors that influence the protocols to compliance. A descriptive cross-sectional design was employed on a population of 98 nurses working in surgical, outpatient, theatre, and maternity departments at Karatina Sub-County Hospital. Stratified random sampling method was used. Data was collected using observational checklist and self-administered questionnaire. The tools were pretested at Mukurweini Sub-county hospital in Nyeri, which offers similar services as Karatina Sub-County Hospital. Data was analyzed through descriptive statistics such as frequencies, percentages, mean, as well as standard deviation and inferential statistics i.e. chi square and multinomial regression analysis, using SPSS version 25.0. The level of confidence was set at 95%. The level of adherence to WHO guidelines on SSI prevention was 44.9%. There were more male nurses who adhered to the SSI prevention guidelines than female ($p < .001$), availability of hospital policies on SSI prevention significantly contributed to high level of adherence ($p < .001$). In conclusion, hospital policy on SSI prevention can potentially reduce the incidences of surgical site infections.

Keywords: Adherence, World Health Organization guidelines, Prevention, Surgical site infections

Estimation of Crop Water Requirements for Garden Pea, Sweet Pepper and Tomato using the CropWAT Model in Maragua Watershed, Murang'a County, Kenya

Maingi, S., Ndiiri, J. & Mati, B.

Jomo Kenyatta University of Agriculture and Technology, Kenya

Correspondence: maingisusan@gmail.com

Abstract

Agriculture requires water as a key input for growth hence, determination of crop water requirement is one of the key considerations for accurate scheduling of irrigation especially during the dry season when rains subside. This study determined the crop water requirements and irrigation scheduling for garden peas, sweet pepper and tomatoes in selected regions of Maragua watershed located in the Upper Tana Catchment. The crop water requirement for each of the crops was determined by FAO CROPWAT 8.0 model, using 10 years' climatic data obtained from Kenya Meteorological Department. To determine the crop water requirements (CWR), reference crop evapotranspiration (ET₀) and crop factor (K_c) were used. Reference crop evapotranspiration (ET₀) was determined using meteorological data where Maximum and Minimum Temperature, Wind Speed, Relative Humidity and Sunshine Hours were considered as input and Reference Crop Evapotranspiration considered as output. Results showed that ET₀ varied from 3.01 to 5.10 mm/day and the effective rainfall varied from 8.0 to 154.4 mm. The crop water requirements for representative crops were 395.6, 460.1 and 432.7 mm/dec respectively. Irrigation requirements were 155, 187.7 and 158.7 mm/dec respectively. The total gross irrigation mean and total net irrigation means were 190.9 mm and 133.7 for garden pea with two irrigation schedules, 116.1 mm and 81.3 mm for tomato with six irrigation schedules and 67.2 mm and 47.0 mm for sweet pepper with six irrigation schedules. Results of this study are useful in water resource planning to optimize utilization of water to meeting crop water requirements and guide farmers on selecting the amount and frequency of irrigation for the crops being studied.

Keywords: *CropWAT; Irrigation Schedules; Irrigation requirement; Crop Water Requirement.*

Determinants of Prostate Cancer Screening Uptake among Men Aged 40 Years and Above in Ruiru Sub County, Kenya

Mureithi, M.¹, K'Odhambo, M.O², Mureithi, J.³, Murigi, M.⁴

^{1,2,3} Kenyatta University, Kenya ⁴ Kirinyaga University, Kenya

Correspondence: mureithimargaret18@yahoo.com

Abstract

Background: The Kenya Demographic and Health Survey in the year 2014 indicated that two-thirds of Kenyan men age 15-49 have heard of prostate cancer and that, only three percent of males aged 40 years and above have ever had a prostate cancer screening. This signifies that prostate cancer screening is still uncommon among Kenyan men despite prostate cancer being ranked third among commonly diagnosed cancers globally. It's against this background that this study was initiated to assess the determinants of uptake for PC screening among men aged 40 and above living in Ruiru Sub County. The study adopted a descriptive cross-sectional design. Quantitative data was collected using a semi-structured questionnaire. Data was analysed using Statistical package for data analysis (SPSS) and presented as descriptive statistics using mean, percentages and proportions while Inferential statistics that is standard deviation and Chi-square values were used to determine the statistical significance ($p \leq 0.05$). Results showed that most men (87%) were aware of prostate cancer. marital status $P = (0.007)$, occupation ($p = 0.019$), fear ($p = 0.005$), shyness/ embarrassment ($p = 0.034$) and the level of education ($p = 0.005$) significantly influenced the uptake of prostate cancer screening among males aged 40 years and above. Noteworthy, education about prostate cancer screening did not significantly influence the decision by males in this age brackets to get prostate cancer screening. More efforts are needed to encourage adult male who are highly at risk of prostate cancer to go for voluntary screening as early detection have been shown to improve the disease outcome. In addition, a dire need for increased awareness of prostate cancer screening to demystify the condition by healthcare workers, Ministry of Health, faith-based organizations, family as well as friends.

Keywords: *Prostate Cancer, Cancer Screening, Cancer Screening Uptake*

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

Ngari, M.¹ Munzi, A.M.², Machwara, N.³ Njogu, W.⁴

¹Karatina University, Kenya ²Kirinyaga University, Kenya ³Kenyatta University, Kenya, ⁴University of New South Wales, Australia

Correspondence: dennisngare@gmail.com

Abstract

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

Keywords: *Health Facility Factors; Type 2 Diabetes Mellitus; Secondary Prevention Practices; Kenya*

Extent to which Visual Inspection with Acetic Acid Screening Guidelines are Adhered to in Selected Health Facilities in Embu County Kenya, Before and After Intervention.

Maina, E.M.¹, Abednego, O.², Innocent, M³, Emmah, M⁴, Mary, M⁵

^{1,4}Kirinyaga University, Kenya, ²Agakhan University Obstetrics and gynecologist/Oncologist, Kenyatta National Hospital, Kenya, ³University of Nairobi, Kenya.

Correspondence: evahmaina73@gmail.com

Abstract

Cervical cancer is one of the few diseases that reflect global inequities. In low and middle income countries, its incidence is nearly twice as high and death rates three times as high compared to high income countries. Visualizing with acetic acid encompasses vaginal examination using a speculum, followed with application of dilute (3 - 5%) acetic acid (vinegar) to the cervix. Presence of abnormal tissue often temporarily appears white when exposed to vinegar and then cervical color changes are observed with a naked eye. The outcome of Visual inspection with acetic acid is subjective and depends on the level of skill of health care provider, availability of supplies and adherence to procedure guidelines. This study sought to determine the extent to which visual inspection with acetic acid guidelines are adhered to in selected health facilities in Embu county prior to and after intervention. Fourteen health care providers were taken through a two-day intensive VIA didactic training and a four-day clinical practice with guidance of preceptors. The facilities where respondents were recruited from were selected using a purposeful sampling method. Prior to intervention, baseline data was taken that included use of questionnaires and observational checklist to determine adherence to VIA guidelines. The health care providers were then followed up for a period of four months and 434 women were screened. The study area was Embu County in Kenya and the target population was the health services providers who provided VIA services in government facilities. Primary data was collected through self-administered questionnaires and observational checklists and secondary from health facility records and KDHS 2014. Data was analyzed using quantitative techniques. Despite the respondents having prior training on cervical cancer screening using VIA/VILLI, positivity rate was low before intervention. The guidelines were poorly adhered to prior to training but improved adherence was recorded after training, and healthcare providers made correct diagnosis and identified precancerous lesions after intervention. Cervical cancer screening uptake also scaled up. Baseline positivity was 0.8% but rose to 14.1% after training. There is need to revise MOH VIA training guidelines and curriculum to accommodate clinical practice for at least 4 days after 2-day didactic training with use of preceptors and cervical images.

Keywords: *Visual Inspection, Acetic Acid Guidelines, Cervical Cancer.*

Mathematical Modelling of Covid-19 and Diabetes Comorbidity under Vaccination

Adongo, F.A.¹, Aminer, T.², Okelo B¹, Onyango, B²

^{1,2}Jaramogi Oginga Odinga University of Science and Technology, Kenya

Correspondence: floreceeadongo@gmail.com

Abstract

Corona virus disease 2019 (COVID-19) is caused by severe acute respiratory syndrome corona virus 2 (SARS-COV-2). It is a global pandemic with devastating effects, leading to deaths in many cases. It was first reported in Wuhan, China in 2019 and rapidly spread across the world. The comorbidity with underlying conditions such as diabetes results to more serious illnesses with higher chances of deaths. This may be attributed to lowered immunity, which makes it harder for patients to fight the virus leading to longer recovery periods since SARS-COV-2 thrives in an environment of elevated blood glucose. Diabetic patients infected with COVID-19 often experience inflammation or internal swellings and increased risk of diabetic ketoacidosis (DKA) which results in sepsis. The Kenyan Ministry of Health reported diabetes as a comorbidity which constitutes up to 15 % of the total COVID-19 deaths. Although mass vaccination regimes have been introduced in Kenya, its influence on protection of diabetic patients against COVID-19 is not well established. There is need for a well synthesized modeled data on COVID-19 and diabetes comorbidity to advise policy with respect to anti COVID -19 vaccination in Kenya. The objective of this study was to: formulate a mathematical model on effects of COVID-19 and diabetic comorbidity vaccination. The model consists of a system of non linear ordinary differential equations. This model will be used through analysis and simulation to highlight the effects of COVID-19 and diabetes comorbidity under vaccination, the expected results of this study will help policy makers and health practitioners in planning and allocating resources towards management of the diseases and development of more effective vaccine.

Keywords: Comorbidity, COVID-19, Ketoacidosis (DKA, Diabetes and Vaccination).

Role of Bone Morphogenetic Proteins (BMPs) and TGF- β Receptors in the Pathogenesis of Endometriosis

Mecha, E.¹, Mwaura, A.^{1,2}, Maoga, J.², Makunja, R¹, Omwandho, C. ^{1,3}, Tinneberg, H.R², Konrad, L.²

¹*University of Nairobi, Nairobi, Kenya, 2 Justus-Liebig University, Giessen, Germany, 3Kirinyaga University, Kerugoya, Kenya*

Correspondence: emecha@uonbi.ac.ke

Abstract

Endometriosis is a disease characterized by presence of endometrial tissue outside the uterus and affects approximately 2-10% women of the reproductive age and about 20 to 50% of women suffering from infertility. TGF- β s have been found to be highly elevated in blood and tissues of endometriotic patients. TGF- β s transduce their signals mainly through activation of Smad2 and Smad3 proteins. They can also strongly but only transiently induce phosphorylation and activation of Smad1, Smad5 and Smad8 (BMP-responsive Smads) in endothelial cells, epithelial cells, fibroblasts and epithelium derived cancer cells. These observations have raised several questions on activation of Smads1/5/8 by TGF- β s affect BMP responses. Previous studies have shown involvement of ALK-5 which is a BMP specific receptor and formation of pSmad3-pSmad1/5 complexes hence the need to investigate the exact role of TGF- β and BMP in the pathogenesis of endometriosis. This study sought to investigate the possible role of TGF- β and BMP pathways in the pathophysiology of endometriosis. Commercial human endometriotic and endometrial cell lines were used in this study. Immortalized human endometrial stromal (T-HESC), epithelial (HES), endometriotic stromal (22B) and epithelial (12ZVK) cell lines were treated with or without BMP inhibitors, with or without TGF- β 1 or TGF- β 2, respectively, and the cell numbers were counted. Quantification of TGF- β s and BMP interaction was investigated by measuring levels of Plasminogen Activator Inhibitor 1 (PAI-1) secretion by the cells. Results showed that, TGF- β 1 and TGF- β 2, respectively, increased PAI-1 secretion in all cell lines studied. Treatment of cell lines with the BMP inhibitor demonstrated a complete decrease (100%) of TGF- β 1 or TGF- β 2 induced-PAI-1 secretion in all cell lines studied. In addition, treatment of cell lines with ALK-2 inhibitor demonstrated 100% decrease (100%) of TGF- β 1 or TGF- β 2 induced-PAI-1 secretion in all cell lines, whereas the ALK-3 and ALK-6 inhibitors demonstrated only 40% and 25% decrease, respectively. Treatment of cells with the IgG1 (control) had no effect on TGF- β 1 or TGF- β 2 induced-PAI-1 secretion. Results of this study demonstrated that both BMP and TGF- β receptors are involved in signaling pathways in endometrial and endometriotic cells both BMP as well as an ALK-2 inhibitor completely blocked the TGF- β -induced PAI-1 secretion whereas ALK-3 and ALK-6 inhibitors only partly blocked it. These findings strongly suggest that ALK-2 is the point of cross talk between the BMP and TGF- β s pathways and that both pathways might be involved in pathogenesis of endometriosis. This finding might provide new insights into the roles of TGF- β s in the pathophysiology of endometriosis.

Keywords: *Bone Morphogenetic Proteins (BMPs), TGF- β Receptors Pathogenesis, Endometriosis.*

Prevalence of Wasting in Children Under Five Years Admitted at the Pediatric Ward in Kitale County Referral Hospital

Kagoiyo N.¹, Kagoiyo, S.², Gachangi, J. N.³, Muthui, G.³

¹Kirinyaga University, Kenya, ²Kerugoya County Referral Hospital, Kenya

³Jomo Kenyatta University of Agriculture and Technology, Kenya

Correspondence: snjeru@kyu.ac.ke

Abstract

The term wasting is used to describe a child who is too small for his or her weight. It results from sudden or acute malnutrition, where the child does not get enough calories from food and is therefore exposed to risk of death. This study assessed the prevalence of wasting in under five years' children admitted in the pediatric ward in Kitale County Referral Hospital. Study design was based on a descriptive cross-sectional study. Prevalence of severe wasting was 14.2% and 18.4% for moderate wasting. The overall diet quality was inadequate due to budget for patient food, low priority for nutrition as part of medical treatment and failure to adhere to the hospital menu. It is recommended that all children aged 6-60 months admitted should be provided with the recommended diet. The ministry of health should deploy more qualified nutrition personnel to similar facilities to assist in taking anthropometric measurements for the children on admission, regularly after admission and upon discharge from the hospital to enable them capture malnourished children in the hospital.

Keywords: *Prevalence, Wasting, Children, Five Years Pediatric Ward, Kitale County Referral Hospital*

Evaluation of the Determinants of Clinical Medicine Training Outcomes in Western Kenya

Njeru, S.K.¹, Adoka, S.O.², Onguru, D.³

¹Jaramogi Oginga Odinga University of Science and Technology, Kenya, ²Maseno University, Kenya

³Jaramogi Oginga Odinga University of Science and Technology, Kenya

Correspondence: snjeru@kyu.ac.ke

Abstract

The objective of this study was to analyze the learner/instructor interaction process within the context of theory learned during training put into clinical practice. In order to elevate limitation in the institutions that undertake Clinical Medicine training.

Across sectional study was used and the study carried out in Lake Basin Region of Kenya including Kisumu Vihiga and Nandi Counties. Sixty-six (66) Clinical Medicine students from various MTIs in Kenya, 58 health workers, 3 heads of departments from KMTCs and 5 other HODs in the clinical placement sites as well as 4 lecturers of MTIs were included in the study. Analysis from observations of student/lecturer/infrastructure/leadership/linkage engagements were obvious and more so the absence of libraries in all RHTCs. The county Hospitals including (JOOTRH) had libraries which were inaccessible to Clinical Medicine students. There were linkages and networking processes in all the training health facilities that were used as clinical placement sites. Students for clinical placements came from all MTIs in Kenya among who were all KMTCs, GLUK, Uzima University College, Mt Kenya University, Moi University and others. There was evidence of active interactions both academically and socially, and with active ICT services linking the students nationally regionally and internationally

Keywords: Evaluation, Determinants, Clinical Medicine, Training Outcomes, Western Kenya.

Factors Influencing High Child Mortality in Karemo Subcounty, Siaya County – Kenya

Kagoiyo S.N.¹, Kagoiyo, S.², Webale, M.³

^{1,3}Kirinyaga University, Kenya ²Kirinyaga county hospital-Kerugoya, Kenya

Correspondence: snjeru@kyu.ac.ke

Abstract

This study sought to determine factors influencing child mortality rates at Karemo sub-County, Siaya County Kenya using a descriptive cross sectional study. Three hundred and twenty-six (326) caregivers of children under five years at house hold levels were included in the study. The education level of a mother played a major role in influencing child survival thus the higher the educational level of a mother, the higher the chances of her child surviving. Such mothers appreciated the importance of giving the child balanced diet, and were able to access nutrition information from other sources such as internet, they took counseling positively, and were not so much into cultural practices they are able to shun away bad and promote good cultural practices, they appreciate the importance of cleanliness, they are practice family planning and they are able to interpret and comprehend prescriptions

Keywords: *Child Mortality, Karemo Subcounty, Siaya County, Kenya*

Socio-Cultural Barriers to Comprehensive Healthcare among the Elderly Population in Kenya

Marwa, I.N.¹, Mwita, M.,B.²

¹Kirinyaga University, Kenya, ²University of Eastern Africa- Baraton, Kenya

Correspondence: imarwa@kyu.ac.ke

Abstract

Globally there is a growing population of the elderly both in rural and urban setting. The healthcare system in Kenya is tailored towards curative services, demerits the elderly in need of rehabilitative care. However, gerontology a field of interest to the aging populations, has not received the urgent attention from both the national and county governments. Compounded with the already existing socio-cultural barriers to quality healthcare there is increased morbidity and poor quality of life. This paper highlights the socio-cultural barriers to comprehensive healthcare services among the elderly population in Kenya. The study employed a descriptive qualitative approach to conduct the study in Nandi County in Kenya. Data was collected and analyzed through a combination of focused ethnography and grounded theory respectively. Data was collected through use of unstructured interviews, participant observation and focused group discussions. The study highlighted aspects of socio-cultural barriers to comprehensive healthcare among the elderly population: Culturally determined gender roles and expectations, religious embedded beliefs and practices, child/ parent expectations, lack of sufficient health resources and relevant geriatric knowledge among the healthcare providers, community cultural beliefs and perceptions on growing old, lack of self-care and self-determination for self-management play a role on the success of geriatric. It is recommended that health care policies and services targeting the elderly in Kenya, should be crafted while putting into consideration the cultural differences and expectations of the elderly population. There is also need to establish rural retirement homes for the elderly to demystify the suspicious children / parents cultural expectations.

Keywords: Gerontology, Socio-Cultural, Healthcare, Aging/elderly, Barriers.

Challenges in the Management of Chronic Comorbid Conditions (Diabetes and Hypertension) in Kenya
Marwa, I.¹, Mtshali, G.²

¹ Kirinyaga University- Kenya, ²University of KwaZulu Natal-South Africa

Correspondence: imarwa@kyu.ac.ke

Abstract

Management of chronic conditions requires a comprehensive care provision to persons at risk and those affected by coexisting conditions. Comorbidity of non-communicable diseases pose a new global challenge to the health systems, especially those in resource limited settings. The efforts towards provision of health for all and meeting the global goal of universal health coverage and the big four government agenda requires inclusion of chronic comorbid conditions within the health care settings. This paper describes challenges in the management of chronic comorbid conditions (Diabetes and Hypertension) in primary health care settings in Kenya. The study adopted a constructivist, qualitative approach and a combination of focused ethnography and grounded theory research designs. Ethnography design was used during data collection through participant observation; structured interviews, document analysis and focus group discussion. The study used constant comparative method in the field to ensure rich data collection. The study was conducted in seven health facilities using 40 informants (patients, care providers and administrators) who were purposively selected in Nandi County, Kenya. Data was analyzed using the three phases Open, axial and selective coding as presented in Strauss and Corbin substantive model. The study identified accessibility to chronic care services, community participation and preparedness as the main challenges to self-management of chronic combined diabetes and hypertension. Limited knowledge on comorbid conditions, belief systems, cost implications, and provider-patient perceived factors were also highlighted. Results of this study form the basis for strategic planning towards improving chronic care and improving the quality of life for people living with multiple comorbid chronic conditions.

Keywords: *Comorbid Conditions, Primary Health Care, Diabetes and Hypertension, Management Challenges.*

Analysis of ADAM12 in the endometrium and ADAM12 Levels in Serum and Endocervical Mucus of Endometriosis

Mwaura, A.N¹, Scheiner-Bobis, G², Maoga, J¹, Mecha, E³, Omwandho, C.O.A^{3,4}, Riaz, M.A¹, Konrad, L¹

¹*University, Giessen, Germany*, ²*Justus-Liebig University, Giessen, Germany*, ³*University of Nairobi, Kenya* ⁴*Kirinyaga University, Kenya.*

Correspondence: njokimwaura8@gmail.com

Abstract

Endometriosis is an estrogen-responsive disease defined as the presence of endometrial glands and stroma outside the uterine cavity, predominantly but not exclusively in the pelvic compartment. Its main clinical features comprise chronic pelvic pain, dyspareunia and infertility. A disintegrin and metalloproteinases (ADAMs) are a family of membrane anchored cell surface glycoproteins that are responsible for proteolysis, cell adhesion and metastasis of tumor cells. In this study, we investigated localization of ADAM12 in the eutopic and ectopic endometrium ($n = 136$) using immunohistochemistry. We also analyzed ADAM12 levels in serum ($n = 293$) and endocervical mucus ($n = 79$) of women with and without endometriosis using ELISA. A preferential localization of ADAM12 in the glandular and the luminal epithelial cells in the eutopic endometrium with and without endometriosis as well as in ectopic endometrium was observed. Additionally, ADAM12 was found to localize in the endothelial cells of blood vessels and smooth muscle cells of the myometrial layer of eutopic endometrium. Localization of ADAM12 showed no differences in eutopic endometrium of controls compared to those with endometriosis. Similarly, serum and endocervical mucus ADAM12 levels were not different between women with and those without endometriosis, although endocervical mucus ADAM12 levels were significantly lower than serum levels in paired samples. Collectively, our results show that localization of ADAM12 is highly stable in eutopic and ectopic endometrium without any loss of the epithelial phenotype and therefore is unlikely to contribute to the pathogenesis of endometriosis.

Keywords: *ADAM12, Endometrium, Serum, Endocervical Mucus, Endometriosis*

**Examination of Rarely Disguised Features of Handwriting: Kirinyaga University,
Kenya
Alwora, A.**

Kirinyaga University, Kenya

Correspondence: aalwora@kyu.ac.ke

Abstract

Every individual's style of writing is unique and has a personalized touch. Disguised handwriting is a wilful modification of a person's natural writing with the aim of concealing authorship requires a lot of attention to detail. This is the method usually used by suspects when providing handwriting samples to court for forensic document examination. It is also used commonly in anonymous letter writing by such individuals as those involved in execution of bomb threats where individuals try to hide their identities. The purpose of this study was to examine the characteristics of handwriting and identify the features that are rarely disguised therefore allowing authorship identification. The study targeted students from different departments within Kirinyaga University and feedback obtained from 200 randomly sampled students. The students were given an exemplar paragraph containing most common word combination, punctuation, distinctive letters and numerical combination. Two handwriting samples were obtained from each respondent, natural handwriting and disguised handwriting. The natural handwriting was examined and classified into class characteristics and individual characteristics and compared against the disguised handwriting samples. The chi-square test was used to determine whether there is significance difference between expected frequencies and observed frequencies. Features that were rarely disguised included punctuation position, slant, word spacing and change of letter case. This paper presents an analysis of rarely disguised features of handwriting that are critical in assisting forensic document examiners in establishing the authorship of questioned documents.

Keywords: *Disguised Handwriting, Questioned Document, Forensic Document Examiners.*

Evaluation of Bacteriological Quality Status of Shallow Wells in Tharaka Nithi County, Kenya

Chabari, K., S., & Ogolla, F.

Chuka University, Kenya

Correspondence: Kithakasam@yahoo.com

Abstract

Water shortage that is caused by long droughts and higher cost of accessing piped water have forced many households in Kenya to opt for shallow wells and borehole water. Where they are used, shallow wells are exposed to risk of contamination by pathogenic microorganisms from nearby toilets, faecal material from domesticated animals and surface runoff. Despite the known health concerns of consuming contaminated water, many rural residents still consume water from shallow wells whose portability is not determined and may not meet WHO standards. This study was conducted to determine bacterial safety of selected shallow water wells in Maara, Igamba Ngombe and Tharaka Constituencies between April to September 2019. A total of 108 water samples were collected from 36 shallow water wells. Samples were analyzed at Chuka University using most probable number methods, Plate count and bacteria species identified using selected biochemical methods. Data (MPN) for total and fecal coliforms were for different location of study and shallow wells were log transformed (\log_{10} (cfu+3) and compared using general linear method in SAS. Significance means were separated using least significant difference post hoc test in SAS version 9.4. Number of bacterial isolated from water samples were compared using a general linear model. Feecal coliform values exceeding WHO recommendation of (0 CFU/ 100 ml was observed in all borehole waters surveyed. Mean MPN value of 17.5/ 100 ml CFU was observed in Kawangware. Coliform bacteria *E. coli*, *Bacillus spp*, *Klebsiella spp* were isolated in all the water sampled. However, *E. coli* followed by *Bacillus spp* were higher compared to the rest of isolates. Occurrence of these bacteria in shallow water wells put the health of dependent consumers at risk of infection.

Keywords: *Shallow Wells Water, Bacteriological, Contaminants, Tharaka_Nithi, Kenya*

Partograph Completion: A Comparison Between Faith-Based Mission Hospitals and County Public Teaching and Referral Hospitals in Upper Eastern, Kenya.

Barasa, S.¹, Miriti, A.¹, Silas, P.¹, Murigi, M.², Munyalo, B.³, Maithya, R.³, Jebet, J.⁴, Shikuku, D.⁵.

¹Kenya Medical Training College, Nairobi, Kenya, ²Kirinyaga University, Kenya, ³Amref International University, School of Nursing, Nairobi, Kenya, ⁴University of Nairobi, Kenya, ⁵Kenya.Liverpool School of Tropical Medicine, Kenya

Correspondence: mmurigi@kyu.ac.ke

Abstract

Ninety-nine per cent of global maternal deaths, partly caused by obstructed labor, occur in sub-Saharan Africa. The World Health Organization recommends that all mothers in labor be monitored correctly in labor to detect complications early. The partograph, when used properly to monitor labor, can avert maternal and fetal health complications. The rate and quality of completion in public hospitals is known. However, not much is known on how the rate of completion of the partograph compares among the faith based hospitals (FBH) and CRH, yet FBHs form a significant part of the health system globally. This study aims at comparing completion rates of the WHO modified partograph between FBH and CRH in upper Eastern, Kenya. This was a cross-sectional descriptive study involving retrospective records review. The sample size was 365 partographs from Faith based hospitals and County hospitals (83 and 282 respectively). Quantitative data was collected using a standard protocol checklist and analyzed descriptively using means, percentages, standard deviations, and the independent-samples t-test. Qualitative data was collected using key informant interview. Frequency tables, bar graphs and charts were used to present data and relevant verbatim from Key Informant Interviews included. Based on fetal, labor and maternal monitoring, 54.9% [95% (CI: 34.95, 74.92) of all the partographs were completed to standard. The average rate of completion to standard was lower in FBH (43.1, SD=23.19.) than in CRH (58.3; SD=19.16, $p = 0001$). Only 39.0% of births had fetal monitoring completed to standard in FBH compared to CRH (60.5%). Patient's name (86.75%), parity (82.75%) and gravidity (82.75%) were the most commonly recorded socio- demographics. On the other hand, labor was the most monitored parameter to standard in FBH and CRH (67% and 73.8% respectively). Overall, maternal monitoring was either substandard or not recorded at all in 59.3% and 76.7% births in CRH and FBH respectively. Lower completion in FBH was associated with high staff turn-over, staff shortages and inadequate experience. Facilitating factors in CRH include trainings, meetings to audit progress, and presence of nurse-trainees. The quality and rate of completion of the partograph in our study setting is sub-optimal giving a significant difference between partograph completion in FBH and CRH. FBH and CRH should engage in more collaborations and further research to establish ways of improving quality of partograph completion in order to reduce maternal mortality and morbidity in line with sustainable development goal three.

Keywords: Partograph, Completion Rates, Comparison

A 2-Year Retrospective Survey of Dog Bite Cases Reported at Narok County Referral Hospital, Kenya

Chepkoech, J., & Oduori, D.O.

Maasai Mara University, Kenya

Correspondence: dr.obiero@gmail.com

Abstract

Rabies is a zoonotic disease with a global health burden estimated at 59,000 deaths annually. It is listed among the top 3 priority zoonotic diseases in Kenya. Human animal-bite injuries are a serious public health concern due to their associated risk for rabies virus exposure. Animal-bite injuries, especially dog bites are useful proxies for assessing the risk of rabies transmission. The objective of this study was to estimate the frequency of dog bite cases reported in Narok County Referral Hospital and obtain information on the demographics of dog bite patients. The review was to complement other baseline activities as precursors to implementation of future rabies vaccination and spay-neuter campaigns. Outpatient and anti-rabies vaccine registers were assessed for the period October 2018 to September 2020. Data on age, sex, area of residence and administration of rabies virus Post Exposure Prophylaxis (PEP) was extracted and subjected to descriptive analysis. A total of 112 dog bite injuries were reported. The proportion of children bitten was relatively higher than that of adults. Male victims (58.9%) were more than female victims (41.1%). Most of the dog bite cases were from Narok North sub-County. The median age for dog bite victims was 13 years. The monthly arithmetic means for bites falling within the year 2018-2019 and 2019-2020 was 4.8 and 4.6 respectively, the difference was not statistically significant, p value=0.86. Quality issues were elucidated with regards to the records accessed, parameters such as date of bite, site of the bite, status of administration of PEP, were not indicated. Public health education on responsible dog ownership should primarily target children below the age of 15. Health facilities should improve the quality of records to facilitate monitoring and the development of a more robust epidemiological picture.

Keywords: *Retrospective Survey, Dog Bite Cases, Narok County Referral Hospital, Kenya*

Thin Layer Chromatographic Analysis of Commonly Abused Cough-Cold Medications

Obondi, G. O.

Kirinyaga University, Kenya

Correspondence : gobondi@kyu.ac.ke

Abstract

The COVID 19 pandemic took the world by surprise in the year 2020 and its effects are still being felt although governments globally responded by putting in place measures to mitigate its spread. These measures included among others lockdowns, curfews, wearing face masks in public places, hand washing and social distancing. The curfew and lockdowns lead to the closure of public joints, bar and restaurants, somewhat rendering alcohol and other drugs of abuse inaccessible. Most addicts were left with no choice but to lay their hand on anything that could make them high. Cough medications containing antihistamines such as chlorpheniramine malate, antitussives such as dextromethorphan and codeine, decongestants such as phenylephrine and expectorants such as guaifenesin and sleep aids were highly sought because they could be accessed without prescription. These medications were in many cases routinely mixed with soft drinks to make them palatable. Being that their detection by the law enforcing officers is minimal alcohol and drug abusers were able to consume them anytime, and even behind wheels, potentially leading to commission of other social crimes and accidents. This study used thin layer chromatography to analyse common cough-cold medications that were likely to be found in possession of the abusers. Fifteen solvent systems were studied to evaluate which one gave the best isolation separation and identification of the cold medication components. The System comprising ammonia: methanol in the ratio of 2:80 (v/v) and another comprising of methanol: chloroform in the ratio of 10:90 (v/v) were found most suitable for separation. It was further established that iodine fuming was the best visualizing technique for the chromatograms of the cough-cold medication samples preceding subsequent confirmatory analysis.

Keywords: Thin Layer Chromatographic Analysis, Abused Cough-Cold Medications

Resistance of *Anopheles gambiae* sensu lato to Pirimiphos-methyl Insecticide in Kakamega County, Highlands of Western Kenya

**Kitungulu, N.^{1,2}, Guyah, B.², Webale, M.³, Shaviya, N.⁴,
Machani, M.⁵, Mulama, D.², Ndenga, B.⁵, Tarus, J.J.²**

^{1,2}*Maseno University, Kenya*, ²*Masinde Muliro University of Science and Technology, Kenya*,
³*Kirinyaga University, Kenya*, ⁴*Centre for Global Health Research*, ⁵*Kenya Medical Research Institute, Nairobi, Kenya*.

Correspondence: mwebale@kyu.ac.ke

Abstract

Insecticide treated bed nets and Indoor residual spraying remain the principal interventional malaria control strategies. To achieve malaria disease eradication, vector control programmes that monitor insecticide resistance profiles are necessary. This study evaluated pirimiphos-methyl susceptibility of *Anopheles gambiae* sensu lato in Kakamega County, western Kenya. Adult *Anopheles gambiae* sensu lato mosquitoes were assayed using World Health Organization tube bioassay against 0.25% pirimiphos-methyl. Susceptible and non-susceptible populations were characterized to species-level using Polymerase Chain Reaction. Susceptible and resistant mosquitoes were further subjected to G119S Acetylcholinesterase (ace 1R) mutation detection. *Anopheles arabiensis* was the predominant species in all study population in Mumias east (62%), Malava (68%), Ikolomani (77%) and Lurambi (82%). Results showed phenotypic susceptibility to pirimiphos-methyl. Mortality was low in Mumias east (80.6%) and high in Lurambi (89.0%). G119S mutations ranged from 3.0% to 8.9% in *Anopheles arabiensis* but relatively low ranging from 0.0% to 3.1% in *Anopheles gambiae* s.s populations. Study populations tested were consistent with Hardy-Weinberg equilibrium ($P>0.05$). There was pirimiphos-methyl resistance in *Anopheles arabiensis* and *Anopheles gambiae* s.s. study populations and G119S mutation in resistance population. There is urgent need for resistance monitoring and management.

Keywords: *Anopheles Gambiae s.l*, G119S Mutation, Pirimiphos-methyl, Resistance.

Influence of Anthropogenic Activities on Nyangongo Wetland Ecosystem in Nyaribari Chache Sub-County, Kisii County, Kenya

Ogechi, B., Ngetich, J., & Kiplagat, A.

University of Eldoret, Kenya

Correspondence: ogbent@gmail.com

Abstract

Wetlands are among the most productive ecosystems in the world as they perform diverse functions including; flood attenuation, recharge of underground aquifers, climate regulation, erosion control; water provision for human use as well as being habitat for wildlife. Nyangongo Wetland in Kisii County in Kenya covers 825 hectares of land and is key life support system to communities in Lake Victoria Basin. However, this wetland is experiencing intense pressure from unregulated land-use activities that occur in the wetland itself and its catchment area leading to wetland degradation. This study was informed by the theory of tragedy of commons on free access to environmental resources. The main objective of the study was to assess the effects of human activities on Nyangongo wetland over the last 30 years. The study adopted a mixed-method consisting of Remote Sensing and GIS-based analysis, to determine Land Use and Land Cover dynamics and associated human-induced alterations in the wetland. As part of citizen science, 251 respondents were randomly selected for interviews in order to gather data on their overall perception of the wetland, which were corroborated by six Key Informant interviews conducted. The respondents opined that the wetland has been adversely affected by the high demand for agricultural produce and pollution of water sources leading to limited access to clean water. Using image analysis, it was established that the areal extent of the wetland in the year 1984 was 72.85ha which had shrunk to 17.37ha by 2017 presenting a drastic reduction of 76%. On the other hand, the area under vegetation reduced from 609.07ha (73.8%) to 148.86ha (18%) by 2017, while Farmland area increased from 135.65ha (16.4%) to 473.85ha (57.4%). Built-up area which used to be 7.65ha (0.9%) in 1984 expanded to 185.14ha (22.4%) by 2017 due to population pressure. Loss of biodiversity was identified as the most significant negative environmental impact of Nyangongo wetland as it has lost over 460.21ha of vegetation due to agriculture expansion and human settlement. There is need for the County and National governments to intervene by implementing intervention strategies for regulation, restoration and relocation of land uses that are injurious to the wetland and promote appropriate use of the wetland for posterity.

Keywords: *Wetland, Spatio-Temporal, Restoration.*

Membrane-Type 1 Matrix Metalloproteinase (MT1-MMP, MMP14) in Endocervical Mucus of Patients with and Without Endometriosis.

Maoga, J.¹, Muhammad A. R¹, Mecha, E.³, Mwaura, A.^{1,3}, Omwandho, C.^{3,4}, Scheiner-Bobis, G.², Konrad, L¹

¹ Justus-Liebig University, Giessen, Germany, ² Institute of Veterinary-Physiology and Biochemistry, Justus-Liebig University, Giessen, Germany, ³University of Nairobi, Kenya, ⁴ Kirinyaga University, Kerugoya, Kenya

Correspondence: janeykemunto@gmail.com

Abstract

Endometriosis is a benign condition characterized by presence of endometrial tissue outside the uterus. It affects approximately 10% of women of the reproductive age. Membrane-type matrix metalloproteinases are membrane-anchored proteins that show broad activity against extracellular matrix and basement membrane proteins. They also participate in other physiological and pathological processes such as proliferation, angiogenesis and cell invasion. Recent studies have shown involvement of different Matrix metallo proteinases, MMPs in development of endometriosis. We determined the levels of MMP14 in endocervical mucus samples of women with (n=106) and without (n=87) endometriosis using enzyme-linked immunosorbent assays (ELISAs). Results showed that the concentrations of MMP14 in the proliferative phase of women with and without endometriosis were about 34% higher compared to the secretory phase in women with and without endometriosis. There was no significant difference in MMP14 levels in the proliferative phase of women with and without endometriosis. However, MMP14 levels in the secretory phase of women with endometriosis were approximately 29% higher compared to those of women without endometriosis. We found a negative correlation between MMP14 levels in endocervical mucus of women with and without endometriosis and during cycle days. A 29% increase in MMP14 concentrations during the secretory phase of women with endometriosis compared to those without endometriosis might imply that the proteolytic activity of the cervical environment is disturbed and may have a role in the breakout of cells from the tissues.

Keywords: *Matrix Metalloproteinase (MT1-MMP, MMP14), Endocervical Mucus, Endometriosis.*

Solanum nigrum L. Show Anti-Obesity Effects on High-Fat Diet-Fed Sprague Dawley Rats in a Randomized Study.

Nderitu, K.W¹, Onyonka, E. M¹, Nyachieo, A²

¹*University of Nairobi Kenya,* ²*Institute of Primate Research, Kenya*

Correspondence: knderitu276@gmail.com

Abstract

Solanum nigrum also known as black night shade biosynthesizes various bioactive compounds which have various pharmacological activities including treating cardiovascular diseases, diabetes type 2 among others. To assess the anti-obesity effects of *Solanum nigrum* using high-fat-fed diet rats, Sprague Dawley male rats (n=35) of weights 160-180g were assigned randomly into seven groups comprising n=5 rats each. Each group was fed for 11 weeks as follows: normal control (normal chow rat feed); high-fat diet control (HFD); HFD and standard drug (Orlistat 30mg/kg bw); HFD and methanolic extract 150mg/kgbw; HFD and methanolic extract 300mg/kgbw; HFD and dichloromethane extract 150mg/kgbw; HFD and dichloromethane extract 300mg/kgbw. Body mass index and food intake were monitored per week and an oral glucose tolerance test was measured in weeks 5 and 10. Lipid profiles, liver function tests, adipose tissue, liver weights, and phytochemical analysis of *Solanum nigrum* were later carried out. High-fat diet control group rats exhibited a significant increase in body mass index (BMI) while rats administered with leaf extracts of *Solanum nigrum* showed a reduction in BMI. Both low dose of dichloromethane (150mg/kgbw) and high dose of methanol extracts (300mg/kgbw) showed a better reduction in BMI than the other treatment groups. A significant decrease ($p < 0.05$) on low-density lipoprotein-cholesterol, triglycerides and cholesterol was observed among the rats administered with *Solanum nigrum* extracts compared to those of HFD control. Moreover, the HFD control group significantly increased liver and adipose tissue weights compared to other treatments groups ($p < 0.05$). *Solanum nigrum* also decreased glycemic levels and normalized the hepatic enzymes of HFD control. However, food intake among the groups showed no significant difference ($p > 0.05$). Qualitative analysis of *Solanum nigrum* leave extracts indicated the presence of various bioactive compounds associated with anti-obesity. These results validate the use of *Solanum nigrum* in the controlling of obesity.

Keywords: *Solanum nigrum L. Anti-Obesity Effects, High-Fat Diet-Fed Sprague Dawley Rats, Randomized Study.*

Curriculum Related Challenges for KRCHN – BSN Nurse at a Level 5 Hospital**Kamau, S.M. & Mwangi, J. H.***Kirinyaga University, Kenya***Correspondence:** smkamau@kyu.ac.ke**Abstract**

Personal development and pursuance of higher education in nursing is considered important for the nurses to stay abreast in the dynamic medical world and promote excellence in practice. In a world with emerging complex diseases, there is high demand for a highly skilled and critically thinking nurse. At the Baccalaureate level or higher to match international standards. Establish curriculum related challenges that determine whether a nurse enrolls in a diploma to degree nursing program, their performance during the program and their decision to hold on to the end. The study adopted a descriptive cross sectional design, carried out among a randomly sampled population of 220 nurses who work in the hospital. Data was collected using self-administered questionnaires from a simple random sample of 140 nurses. Data analysis was done by SPSS version 22.0. Measures of central tendency mean and range were used. The findings have been presented in form of figures, tables, pie-charts and narrative texts. A total of 120 participants filled questionnaires representing an 85% response rate. 78% (n=93) were female, and 22% (n=27) were male. Curriculum related factors and the decision to upgrade were correlated using chi-square analysis. Despite the differences in opinions regarding the various aspects, there was no significant correlation. Major challenges experienced by the nurses are lack funding in this hard economic time, lack of computer skills, the ever changing world of medical technology and the exhaustion that the nurses suffer when they have to work and study without a break. This study recommend increased funding for the upgrading nurse, computer skills to be added to the curriculum and a studying nurse be officially released from duty the whole duration.

Keywords: *Upgrading Nurse, Diploma, Baccalaureate, Challenges of Diploma Nurse, Upgrading Curriculum.*

SUB THEME: ENGINEERING, SCIENCE, TECHNOLOGY AND INNOVATION**Norm- Attainability of Generalized Finite Operators on C*-Algebra****Amenya, C. S, Musundi, W. S, & Kirimi, J.***Chuka University, Kenya***Correspondence:** amenyacollo@gmail.com**Abstract**

Norm attainability of elementary operators on Hilbert and Banach spaces have been characterized by many mathematicians. However, there is little information on Norm attainability of generalized finite operators on C*-algebra. This Paper therefore, determines the norm attainability of generalized finite operators on C*-algebra. The approach of Okello 2018, has been used to determine norm attainability. Given two pairs of norm attainable operators A, B , implementing the generalized finite operators $\|AX - XB - I\| \geq 1$, it then follows that the generalized finite operator is also norm attainable.

Keywords: *Generalized Finite Operators, Norm attainability, C*-algebra, Complex Hilbert Space.*

Library Programming: An Emerging Trend in Information Dissemination: The Case of Moi University, Nairobi Campus Library.

Mukoma, C.

Kenyatta University, Kenya

Correspondence: Mukoma.catherine@ku.ac.ke

Abstract

The purpose of this paper is to offer emerging opportunities for information access and dissemination that academic libraries can adopt following a downward trend of nonuse of print resources. In the 21st century utilization of library spaces has greatly decreased. Libraries have to search for new ways to keep clients by incorporating new and emerging methods such as library programming, an avenue to educate, engage and interact with professionals as well as the surrounding community as opposed to the university community alone. Library programming is a concept that creates opportunities for the library and community to interact and address topical issues affecting them. This concept is being used in both academic and public libraries in the US. Moi University, Nairobi campus hosts an American space that uses this concept. This paper outlines what library programming entails and examples of programming in libraries and gives a detailed analysis of Moi University, Nairobi Campus Library programming. The programming sessions appealed to a large group of library users and was well received both by the students and staff of the university as well as the general public. There is need for adoption of library programming as a new way of information dissemination in academic libraries.

Keywords: *Library Programming, Information Dissemination, Networking, Chrome Books.*

Factors Influencing Utilization of E-Resources in Academic Delivery: The Case of Multimedia University of Kenya

Diki, P.M.

Meru University of Science and Technology, Kenya

Correspondence: pdiki@must.ac.ke

Abstract

The aim of the study was to investigate the utilization of library e-resources for academic delivery among faculty of Multimedia University, Kenya. Assessed the utilization frequency of library E-resources for by faculty for academic delivery, among Multimedia University faculty members; Explore the impact of utilizing library e-resources for academic delivery among faculty members at the Multimedia University of Kenya; Identify the factors that hinder utilization of the library e-resources for academic delivery among Multimedia University faculty members. The study was informed by Technology Acceptance Model and Unified Theory of Acceptance and Use of Technology theoretical frameworks. The study used quantitative research design, with a population sample of seventy-one. Data was gathered and collected through the use of questionnaire from faculty members. Statistical Package for Social Sciences (SPSS) software was used to analyze the data. The study results showed that majority of the respondents were trained on adoption and access to e-resources through library user education. The study also showed that majority of the respondents rarely visited the library to access the e-resources since they have access to them from their offices or anywhere within the university. The study also revealed that the faculty members adopted e-resources for their teaching and learning and it has greatly impacted on their academic delivery. The study revealed major challenges faced when accessing and utilization of digital information as slow Internet, lack of adequate computers, absence of awareness and lack of proper ICT skills. The following recommendations were made from the study in order to ensure successful utilization and accessibility of digital resources by academic staff in academic libraries, university stakeholders should formulate policies and ensure extensive training is offered to library users, policies which increase reliability of internet connectivity, user awareness of e-resources services through an effective marketing and promotion strategies enacted in libraries to enhance mobilization of more faculty members to utilize the e-resources for academic delivery. Adoption and utilization of e-resources is of vital essence to academic libraries if the research output it to be achieved by faculty members and this thesis suggest what academic libraries could do to improve the services.

Keywords: *Utilization, E-resources, Academic Delivery.*

Development of Antiserum for Rapid Identification of *Erwinia* Spp. isolated from Star-of-Bethlehem (*Ornithogalum* Spp.) and its Control Using Actinomycetes

Waithaka, P. N.¹, Gichuru, E. M.², Githaga ,B. M.³, Gacau, S. W.⁴

¹ Kirinyaga University, Kenya, ,^{2,3,4}Egerton University, Kenya

Correspondence: [pjenga@kyu.ac.ke](mailto:pnjenga@kyu.ac.ke)

Abstract

Erwinia spp. causes soft rot in *Ornithogalum* spp., a flower grown purposely for export in Kenya posing a great risk to national economy. This study sought to produce antiserum against the *Erwinia* spp. using rabbits and to test the sensitivity of the pathogen to actinomycetes isolated from the soils of Menengai crater. *Erwinia* spp. was isolated by first sterilizing the plant tissues using 70% ethanol washed in distilled water and plated in nutrient again. Further sub-culturing on nutrient agar was carried out to obtain pure cultures. Sensitivity of *Erwinia* spp. isolates to actinomycetes crude extracts was carried out using disc diffusion bioassay. Production of antiserum was done by injecting *Erwinia* spp. intramuscularly into the rabbits. The antiserum was tested against the pathogen using immunodiffusion technique. Five potent actinomycetes, PAN 12, PAN 30, PAN 35, PAN 50 and PAN 60 were isolated from the soils of Menengai crater. The *Erwinia* spp. obtained had typical cultural and morphological characteristics of the species. Although there was no significant difference in the zones of inhibition of the *Erwinia* spp. by the actinomycetes isolates, PAN 35 showed the largest zones of inhibition. There is need to control *Erwinia* spp. otherwise horticultural farming in general and growing of the flower in particular will be jeopardized.

Keywords: *Development, Antiserum, Rapid Identification, Erwinia Spp., Star-of-Bethlehem (Ornithogalum Spp.) Control, Actinomycetes.*

**Assessing the Efficacy of Cost of Cloud Systems for Institutional Repository at
Nyandarua National Polytechnics, Nyandarua County, Kenya.**
Kariuki, P.

Nyandarua National Polytechnic, Kenya

Correspondence: kariukip19@gmail.com

Abstract

The study sought to assess the efficacy of the Cost of Cloud Systems for the Institutional Repository at Nyandarua National Polytechnics. A quantitative and qualitative research design was used in this study. 125 respondents comprising teaching staff, HODs, and the administrative staff that added up to 125 respondents. The relationship between the variables was established through correlation analysis. Regression analysis and ANOVA were used. The respondents were asked to state whether record maintenance in the cloud systems technology was comparatively cheaper they responded by 65% who agreed, 25% strongly agreed, 5% strongly disagreed, 4% disagreed and only 1% was neutral. As to whether the institution found it costly to maintain manual records as compared to electronic records, 51% agreed, 48% strongly while only 1% strongly disagreed. Further, on whether the electronic record system was initially costly but cheap in the long run 35% strongly agreed, 10% strongly disagreed and 6% agreed. Only 2% were neutral. The study concluded that a unit change in X₂ will increase the effectiveness of record maintenance in the cloud by 0.631 units and that in the absence of cloud cost, the record maintenance will still be positive at 8.765 since other factors affect the record maintenance such as network accessibility, shared infrastructure, and network security. It is recommended that Nyandarua National Polytechnic should implement its record maintenance on cloud systems technology.

Keywords: *Efficacy, Cost, Cloud Systems, Institutional Repository, Nyandarua National Polytechnics, Nyandarua County, Kenya.*

Establishment of the Currency Detector for the Visually Impaired

Ongili , P. & Wasike , J.

Kirinyaga University, Kenya

Correspondence: opancras@gmail.com

Abstract

For a person with normal vision, recognition of paper currency is an easy task, but this is not the case for a visually impaired person as the latter faces a lot of difficulties in their day-to-day involvements with monetary transactions. They not only have difficulty in recognizing the paper currencies due to the similarity of paper texture, but also the size between different categories of currency notes. Financial institutions like banks can afford expensive hardware such as Automatic Teller Machines (ATMs), automatic banknote sorters, to resolve the issue of currency recognition, but for common people, especially the visually impaired persons, accessing such expensive hardware is a daunting challenge. The aim of the research was to provide visually impaired persons with a cost-effective android application solution to detect currencies and objectives to establish the effectiveness of the current currency detector applications, challenges faced by users of current currency detectors, and develop a viable currency detector for now and future generations. The study centered on currency recognition software that helps distinguish different currency notes. Development techniques utilized incorporated image foreground segmentation, histogram enhancement, area of interest (ROI) extraction, and template matching primarily based on the cross-correlation among the captured picture and the records set. The system will reduce cases of visually impaired persons being coned and limit transactions involving fake currencies, while acting as a benchmarking tool for emerging research and discoveries.

Keywords: *Establishment, Currency Detector, Visually Impaired*

Towards A Framework for Managing Construction Project Labour Productivity in Kenya.

Senteu ole Murianka

Kirinyaga University, Kenya

Correspondence: smurianka@kyu.ac.ke

Abstract

Labour productivity has been held responsible for the success or failure of construction projects in the urban areas in Kenya and beyond. Without standardized metrics for measurement of labour productivity, it becomes difficult or outrightly impossible to estimate the exact cost of a project for both contractors and clients thus leading to escalation of costs, loss in profits, increase in project execution time, stalling of projects and loss of confidence in the construction industry. This research explores the factors affecting construction labour productivity amongst practitioners in Nairobi and on projects within Nairobi. It establishes a definition of the term and evaluates available literature. It then measures through a survey, the effect of information flow on construction Labour Productivity at project level. Five factors are concluded to be critical in project level CLP. The study also provides recommendations on how to manage CLP issues within the industry to increase this productivity.

Keywords: *Labour, Productivity, Construction Projects, Construction Management.*

On (P,Q)-Binomial Extension of Cox-Ross-Rubinstein Model for Optimization of Portfolio with Noisy Observations in Life Insurance

Oburu, J. , Nyakinda, J., Were, J.,& Oduor, B.

Jaramogi Oginga Odinga University of Science and Technology, Kenya.

Correspondence: jeffaroburu234@gmail.com

Abstract

Cox, Ross and Rubinstein (CRR) Option pricing model is a mathematical formula used to estimate value of an American option. The model assumes that the underlying assets price follows a binomial tree. The stochastic approach through CRR Model to insurance portfolio optimization emphasizes the question of whether the new risk is a good mix to the already existing portfolio. One major hindrance to this kind of optimization is the presence of noisy observations which increases risks that lead to losses particularly to insurance companies that often face a stream of liabilities reaching many years into the future. There is therefore a need to determine an optimum portfolio whose features replicates those of the liability stream. A research has been done on q -binomial extension of CRR model and an open question was posed where a further extension of CRR model is required in order to reduce noise in the observation. The objective of this study was to: Develop a (p,q) -extension of CRR model with noisy observations; Establish optimization conditions for the extended model with noisy observations and simulate the outcomes of the model in life insurance. The research methodology involved extending the flexibility of the CRR model using a new parameter while maintaining its original polynomial complexity which has important impact on financial modeling. We considered a (p,q) -binomial distribution whose definition is from (p,q) -binomial coefficients, which gives rise to the (p,q) -random walk and CRR model. We showed convergence of our model to a Black-Scholes model, using a geometric Brownian motion with linear drift and concluded by showing that convergence of option holds with a preferred rate. Given that insurance companies are expected to show solvency as per the Insurance Regulatory Authority (IRA) guidelines, they need to optimize a portfolio with noisy observations.

Keywords: Cox, Ross and Rubinstein (CRR), Binomial Extension of CRR model, Optimization, Noisy observations and Life Insurance.

Spiral Micro-Structured FBG Hydrogen Sensor based on Pd₈₇-Ni₁₃/Pd₄-Ag₁ Thin Film and Femtosecond Laser Ablation

Zhou, X¹, Karanja, J. M², Yang, M³, Ming, X, Z⁴, Liu, K¹, Zhou, F⁵, Dai, Y⁶

¹ Hubei University of Arts and Science, China, ²Kirinyaga University, Kenya,
^{2,3,4,5,6}China National Engineering Laboratory for Fiber Optic Sensing Technology, Wuhan University
of Technology, Wuhan, China

Correspondence: jmkaranja@kyu.ac.ke

Abstract

A novel laser machined spiral microstructure fiber Bragg grating (FBG) hydrogen sensor coated with composite sensing film is presented. The sensor probes are sputtered with Pd/Ni and Pd/Ag film respectively. The atomic ratio of the Pd/Ni and Pd/Ag composite films is controlled at 87:13 and 4:1 respectively. Experimental results demonstrate that a pitch 60 µm FBG with double spiral microstructures, coated with 520 nm Pd/Ni and Pd/Ag film has hydrogen gas sensitivity in air of 13 pm/%H and 25 pm/%H respectively. The laser ablated spiral microstructured probes with composite films showed greater sensitivity compared with standard FBG probes with similar coating. The optimum testing temperature (50 °C) enhanced the sensitivity and repeatability of the probes. Due to its high gas response and reversibility, the sensor probe is a potential candidate for hydrogen monitoring.

Keywords: Spiral Micro-Structured FBG Hydrogen Sensor, Pd₈₇-Ni₁₃/Pd₄-Ag₁ Thin Film Femtosecond Laser Ablation

On Density in Norm-Attainable Classes

Owuor, J.¹, Okelo, B.², Owino , J.³, Kinyanjui, J⁴.

^{1,2,3} *Jaramogi Oginga Odinga University of Science and Technology, Kenya*

⁴*Kirinyaga University, Kenya*

Correspondence: josephowuorowino@gmail.com

Abstract

Characterizations of properties of operators in a Banach space setting have been done over years with interesting results obtained. Density of operators that are norm-attaining is one of the important properties that have been considered. However, a complete characterization has not been done in norm-attainable classes. The class of norm-attaining functionals has been characterized through subreflexivity with regard to density. Most researchers have worked on density of Banach space operators, but only partial results have been obtained for specific domains and co-domains of the operators under consideration. In this work, we strive to characterize density in norm-attainable classes. The fundamental concepts like Hahn-Banach Theorem, Radon-Nikodým Theorem, James' Theorem, technical properties like Lindenstrauss properties A, and B, Properties α , β , quasi- α , quasi- β , A^k and B^k and geometric properties of the spaces. The outcomes of this study will help in understanding the link between measure theory and the notion of norm-attainability with the help of Radon-Nikodým Property. Since the link between Bishop Phelps Theorem and nonlinear optimization is known, the outcomes of this work will also enable a deeper understanding of optimization problems and link the areas of norm-attainable operators and measure theory.

Keywords: *Density, Norm-Attainable Class and Norm-attainability.*

On Measure Preserving Transformations and Random Interlacements

Okelo, B.

Jaramogi Oginga Odinga University of Science and Technology, Kenya.

Correspondence: bnyaaare@yahoo.com

Abstract

The study of random interlacements was motivated by questions about the disconnection of discrete cylinders and tori by the trace of simple random walk which has elicited interesting and difficult percolation problems. This study focuses on transformations that preserve measure on probability measure spaces. Regarding ergodicity of these transformations, it is known that if J is a probability measure on F then a measure preserving transformation T on F is an F -measurable transformation called ergodic if all T -invariant events have J -probability 0 or 1. This study has provided the first proof that if two probability measures on the same measurable space coincide on a family of sets which is closed under finite intersections that generate F , then they coincide on the C^* -algebra A generated by that family of sets which is closed under finite intersections that generate F . The study further characterizes random interlacements at level u by showing that it has decaying correlations, is invariant under T and is ergodic with respect to the measure preserving transformations on A . Lastly, atomicity, and uniqueness of the probability measure in A and their implications on random interlacements have been characterized.

Keywords: *Random Interlacements, Ergodicity, Transformation, Measure space, C^* -algebra.*

Characterization of SnS / SnO₂: Sb P-N Junction For Solar Cell Applications

Okinyi D.¹, Ombiro J.², Munji, M.¹, Njoroge, W.¹

¹Kenyatta University, Kenya, ²Maasai Mara University, Kenya

Correspondence: dokinyi@gmail.com

Abstract

Alternative sources of clean and efficient energy are desirable to replace fossil fuels for sustainable development. Photovoltaic technologies using thin film solar cells have become major players in the development of renewable sources of energy. In this study, tin (II) sulphide (SnS) films were prepared and deposited using chemical bath. Preparation of tin chloride was done by weighing different masses to obtain various concentrations in the range (0.05-0.25) M. Tin chloride was then dissolved by adding HCL (5mL). Addition of HCL made the solution transparent. 20mL of 0.1M NA₂EDTA acting as a complexing agent was added into the transparent solution in a beaker and the solution stirred using a glass rod for 4 minutes. Next 20mL of 0.6M of sodium thiosulfate (source of sulphide) was added and the solution stirred for 4 minutes. Ammonium was added to the solution to make it alkaline. Clean glass slides were then vertically placed in the solution without disturbing it. Optical properties of thin film samples prepared such as transmittance, absorbance and reflectance in the range of 200nm to 1200nm were measured using UV-VIS NIR Solid Spec 3700 DUV Spectrophotometer in the range 200nm to 1200nm. Optical measurements were calculated using SCOUT software to determine absorption coefficient and band gap for all the thin films that were prepared. The sheet resistivity of all the thin films prepared were measured by using 4-point probe. The tin (II) sulphide films were prepared at a concentration of 0.1M of tin chloride with a thickness of 62 nm used to fabricate the photovoltaic solar cells. The optical and electrical properties measurements showed that the fabricated solar cell has low transmittance, high absorbance and suitable narrow bandgap for an absorber layer. Based on the optical and electrical values obtained, a p-n junction was fabricated suitable for solar cell applications.

Keywords: Band Gap, Photovoltaic, P-N Junction, Solar Cell.

**Arnold's Factorization Algorithm for Semi-Primes and the Crypt-analysis of RSA
Cryptosystem**
Oyaro, A. & Omolo, R

Jaramogi Oginga Odinga University of Science and Technology, Kenya

Correspondence: arnolaeustein9790@gmail.com

Abstract

RSA Cryptosystem was developed by Ronald Rivest, Adi Shamir and Leonard Adleman in 1977. It is currently used to secure several online entities such as e-mails, VPNs, online banking and web browsers among others. The efficiency and security of RSA Cryptosystem relies heavily on the difficulty of factorizing very large semi-primes. Arnold's Factorization Algorithm (AFA) is a simple three step algorithm which seeks to factorize these relatively large semi-primes in polynomial time. In this paper, proof of concept is given for the factorization of up to a 14 digit semi-prime using Arnold's Factorization Algorithm. AFA can be optimized to factorize even larger semi-primes of up to 1000 digits in polynomial time. This is achieved through modulo factorial (modfact) and sequencing which is a combination of the second and third step of the algorithm. The general formula for AFA is: $\text{GCD}(a!, N)$, where a is the square root of N and N is the semi-prime to be factorized. Currently the only known algorithm capable of factorizing such large semi-primes is Shor's Algorithm which is supposed to be used in quantum computers. The feasibility of building the ideal quantum computer for running the algorithm is still decades away. The implications of AFA are vast in both the field of Mathematics and Computer Science. There will be a need to develop more secure cryptosystems for e-commerce sites, online banking and *https* for web browsers.

Keywords: RSA Cryptosystem, Arnold's Factorization Algorithm, Modulo Factorial.

Characterization of Lower Semi-Continuous Functions In L^p -Spaces

Asamba, S¹. O. , Obogi, R.¹, Okelo, B.²

¹Kisii University, Kenya,²Jaramogi Oginga Odinga University of Science and Technology, Kenya

Correspondence : asambasam@yahoo.com

Abstract

Semi-continuity and optimization have been studied by many mathematicians over a long period of time. Characterization of lower semi-continuity and upper semi-continuity has been done in Hilbert spaces and interesting results have been obtained. However, characterization of semi-continuity in L^p spaces has not been done. The objective of this study was to characterize lower semi-continuity in L^p spaces. The methodology involved use of known inequalities like the Cauchy-Schwarz inequality, Holder's Inequality for Integrals and the Minkowski's inequality. We also applied fundamental theorems like Hahn-Banach separation theorem. Our technical approach involved use of Kurush-Kuhn-Tucker (KKT) optimality conditions, first order methods and the interior point method. We have shown that for an L^p -space X , a function $f : X \rightarrow \mathbb{R}$ is lower semi-continuous if and only if its epigraph is closed. It has been proved that for an L^p -space X , if a lower semi-continuous function $f : X \rightarrow \mathbb{R}$ is proper, then it is necessary and sufficient for f^* to be proper. We have further proved that for an open convex subset G of an L^p -space X , a function $\varphi : G \rightarrow \mathbb{R}$ is upper semi-continuous if and only if φ is convex. These results are applicable in finance particularly in risk management, asset and liability management.

Keywords: Lower Semi-continuity, Upper Semi-continuity and L^p -space.

Antimicrobial Activity of Mushroom (*Agaricus Bisporus*) and Fungi (*Trametes Gibbosa*) Extracts from Mushrooms and Fungi of Egerton Main Campus, Njoro Kenya.

Waithaka, P. N.¹, Gathuru, E. M.², Githaiga, B. M.², Onkoba, K.M.²

¹ Kirinyaga University, Kenya, ²³⁴ Egerton University, Kenya

Correspondence: cpnjenga@kyu.a.ke

Abstract

Emergence of drug resistance pathogens has caught the attention of scientist due to the risk of going back to the pre-antimicrobial era. This study was carried out to investigate the antimicrobial properties of mushroom (*Agaricus bisporus*) and fungal (*Trametes gibbosa*) metabolites. *Erwinia spp* and *Ralstonia solanacearum* were isolated from infected plants and together with commercially acquired *Staphylococcus aureus* (ATCC 25923), *Enterococcus faecalis* (ATCC 29212), *Escherichia coli* (ATCC 25922), *Pseudomonas aeruginosa* (ATCC 27853), *Streptococcus pneumoniae* (ATCC 49617), *Proteus vulgaris* (ATCC 49990), *Candida albicans*, *Aspergillus niger* (ATCC 1015), *Fusarium oxysporum* (ATCC 16608), *Ustilago maydis* (ATCC 14826), *Microsporum gypseum* (ATCC 15621) and *Malassezia furfur* (ATCC 14423) subjected to antagonism by mushroom and fungal isolates. Results showed that mushroom and fungal metabolites inhibit growth of the tested pathogens. However, fungal metabolites did not inhibit growth of Gram positive bacteria. Although there was no significant difference in inhibition of the bacterial growth by mushroom extracts ($P=0.09$), fungal extracts significantly inhibited growth of bacteria ($P=0.00001$). There is need to conduct further studies to establish the chemical composition of these antimicrobials.

Keywords: Antimicrobial Activity, Mushroom (*Agaricus Bisporus*), Fungi (*Trametes Gibbosa*), Extracts, Mushrooms, Fungi, Egerton, Kenya

**Subclasses of Analytic Functions Defined by Al-Oboudi Differential Operator
Associated with Pascal Distribution Series**

Oyekan, E.A

Agagu University of Science and Technology, Nigeria

Correspondence: shalomfa@yahoo.com

Abstract

This paper determines the necessary and sufficient conditions for the Pascal distribution series to be in the subclasses $\mathcal{S}(k, \lambda, \delta; \rho)$ and $\mathcal{C}(k, \lambda, \delta; \rho)$ of the analytic functions. Further, an integral operator related to Pascal distribution series is considered. As consequences of these results, some interesting special cases are also considered. In particular, the new results obtained for the subclasses extend the results for the subclasses $\mathcal{S}(k, \lambda)$ and $\mathcal{C}(k, \lambda)$ defined by earlier researchers.

Keywords: *Analytic Functions, Al-Oboudi differential Operator, Hadamard Product, Pascal Distribution Series.*

Trend of Construction Output Growth in Kenya:1977-2021**Mbusi, E.***Kirinyaga University, Kenya***Correspondence:** embusi@kyu.ac.ke**Abstract**

In view of the major role played by the construction industry all over world, it has been noted that this fact is drawing a huge number of scholars into developing some interest in studying the industry more intensively. This study seeks to study the industry in Kenya with the view to establishing whether Kenya's construction industry is growing, stagnant or retarding. Data was collected from the Kenya National Bureau of Statistics (KNBS) and analyzed using graphical and exponential trend analysis methods. Results showed that construction industry in Kenya has been decelerating from 1977 to 2021. There is therefore a need to formulate policy to encourage investment to enable the industry return to a growth trajectory, and more effectively meet the ever-increasing demand for constructed facilities.

Key words: *Construction Output, Constructed Facilities Demand, Exponential Trend*

A Novel Covalently Bonded Amino-Silica for Capillary Ion Chromatography

Maina, E.

Kirinyaga University, Kenya

Correspondence: ewmaina@kyu.ac.ke

Abstract

Capillary columns are at the core of chromatographic separation techniques. These columns were first invented for gas chromatography (GC), but due to the majority of the target compounds being neither volatile nor stable to be separated on a GC system using glass beads packed columns was adopted for LC (liquid chromatography). Packed capillary columns are made by packing a slurry of silica material under pressure with particles $<15\mu\text{m}$ in diameter. Packed capillary columns for ion exchange chromatography (IEC) invented by Small and his coworkers is probably the most frequently used chromatographic media for identification and separation of ionic samples mainly; inorganic anions and cations, peptides and carbohydrates. The purpose of this study was to investigate the retention of anions on a chemically bonded 4-amino butyric acid onto the surface of silica gel. The stationary phase was effectively synthesized and packed. Selection of a suitable cation contained in the eluent resulted in retention and separation of anions and thus, it worked as the anion-exchange stationary phase. The tested anions' elution order was iodate, bromate, bromide, nitrate, iodide and thiocyanate ions, with relatively sharp peaks, which is a common observation in ion exchange chromatography. It was observed that the analyte anion retention decreased with the increase in eluent concentration. Run-to-run repeatability of these anions under isocratic mode were analyzed on the prepared column, and the RSD value, $n=5$ of $< 2\%$ calculated over five or six consecutive runs when 40 mM, 60 mM and 80 mM solutions were used as the eluent. The effect of pH on the column's inorganic anions retention was also explored. The anions were retained more in the column under acidic condition, and less under neutral conditions. The prepared column contained both bromide and nitrate inorganic anions.

Keywords: Silica; Modification; Inorganic Anions; Retention Behavior; Seawater

Mathematical Modelling of Transmission and Re-Infection Dynamics for Covid-19 under Optimal Control Strategies

Musili, M.F, Okelo, B, Ongati, O, & Magwanga, R

Jaramogi Oginga Odinga University of Science and Technology, Kenya

Correspondence: framuli2011@gmail.com

Abstract

Since the emergence of Corona virus, researchers have established that COVID-19 is one of the most worrisome diseases. Intensive researches have and are being done in attempts to unearth better drugs and vaccines that will lessen health burden in the general population. Unfortunately, with all these advances, we still do not have robust answers on how to eradicate this pandemic due to the multiple waves of its re-emergence. This virus keep on mutating, thus even though vaccines such as Pfizer Covid-19 vaccine(BNT162B2), Moderna, Janssen/Ad26.COV 2.S and AstraZeneca have been listed for World Health Organization(WHO) Emergency Use Listing (EUL), it is still doubtful that the pandemic will end. The main objective of this study was to develop and analyze a mathematical model that describes the transmission dynamics of COVID-19 in presence of control measures. The specific objectives of this study were: Develop mathematical model under optimal control strategies; carry out the stability analysis of the model; carry out the sensitivity analysis of the model and perform simulations under optimal control strategies. The methodology of this study involved investigating the model behavior by incorporating re-infection as well as establishing the condition of backward bifurcation. The study used next-generation matrix to analytically generate the reproduction number. The global stability of the disease free equilibrium of the model was investigated using Castillo-Chevez theorem and Endemic equilibrium was studied using Central Manifold theorem. The research applied Pontryagin's Maximum Principle (PMP) to determine the necessary conditions for the optimal control of COVID-19. The numerical simulations was done using MATLAB software to graphically illustrate the impact of various strategies in suppressing the spread of the disease. This study will assist the government in proper resource allocation to deal with the pandemic as well as making predictions about the future trend of the disease.

Keywords: *Covid-19, Re-infection, Optimal Control*

SUBTHEME: ICT, LIBRARY & INNOVATION

Characterization of Topological Points in Big Data Sets of Hausdorff Spaces

Onyango, O, A Okelo , B & Omollo, R.

Jaramogi Oginga Odinga University of Science and Technology, Kenya

Correspondence: onyango.onyangoa@gmail.com

Abstract

Topological data Analysis (TDA) is an important aspect in the field of topological data theory whose foundation roots from applied algebraic topology and computational geometry as from the first decade of the 21st century. Modern TDA utilizes Persistent Homology as an engine, to find the structural features of Big Data sets, otherwise known as point cloud data sets. Topology and Geometry are tools used to analyze highly complex and multi-dimensional data by creating a summary or a compressed representation of all the data features to uncover hidden patterns and relationships in big data, while preserving and collectively considering the relationships within the data. Describing topological points is very intricate due to the nature of Big Data (BD). This makes it difficult to locate Big Data Sets (BDS) particularly in a general topological space setting. Because of the structure in T_2 spaces, it is even more difficult to locate these BDS in Hausdorff spaces. The objectives of the study include; to characterize topological data points in Hausdorff spaces, to locate Big Data sets in Hausdorff Spaces, and to establish distribution patterns of topological data points in Hausdorff spaces. The methodology involved use of Big Data Sets, Persistent Homology, separation criterion of Hausdorff Spaces, Artificial Intelligence (AI) and Machine Learning (ML) techniques, as well as development of algorithms and simulations using python programming language. The results showed that TDA points gives the intimate relationships in Haursdorff spaces. The study is useful to applications in real-time business insights, determination of voter distribution patterns, digital disease detection, computer vision domains and natural language processing.

Keywords: *TDA, Big Data, Hausdorff Spaces, Artificial Intelligence and Machine Learning.*

Named Entity Recognition Using Memory Based Learning Algorithms

Kamau, F.¹, Wasike J.²

¹ *Jomo Kenyatta University of Science and Technology, Kenya*, ² *Kirinyaga University, Kenya*

Correspondence: fmithanga@kyu.ac.ke

Abstract

The information explosion has been remarkably astounding rate and managing it a daunting challenge. The key to this test lays in innovation of information extractions technology that can change unstructured information into organized data to be understood and controlled by machines. Named Entity Recognition (NER) has the capability to extract named entities from unstructured documents, ordering them into pre-characterized semantic classifications and further extracts information in a specific language through use of defined entities. This study sought to analyze named entity recognition algorithms and use them to identify entities. Experimental research methodology employed and data provided using language. This study analyzed named entity recognition using Memory Based algorithm and use them to identify entities. Data collected was used to train a memory-based tool through a statistical based approach. The outcome assisted in solving semantic annotation problem, development of automatic question-answering systems, semantic web probe, and social web problem. The output, a named entity recognition uses memory-based learning algorithm.

Keywords: *Named Entity Recognition, Memory Based Learning Algorithms, Semantic Web Problem, Question-Answering Systems, Precision, Recall and F-Score Measure.*

Dynamical Analysis of Four-Species Food Web System with Prey Refuge and Holling Type III Functional Response

Odhiambo, F., Aminer, T., Okelo, B., & Manyala, J.

Jaramogi Oginga Odinga University of Science and Technology, Kenya.

Correspondence: francisakwenda@gmail.com

Abstract

Coexistence of interacting biological species is vital for management of existing resources and prediction of the long-term survival of each species. Many species become extinct due to several factors including over-exploitation among others. Suitable measures such as restriction on harvesting, creation of reserved zones among others are key in saving these species. Multi-species models incorporating prey refuge with Holling type I functional response have been studied with recommendations on their extension to include either a type II or type III functional responses. However, type II functional responses are de-stabilizing and can lead to extinction since they cause maximum mortality at low prey density. This study focused on adoption of reserved zone in formulating and analyzing an ecological model with a Holling type III functional response and formulate an ecological model of a four species predator-prey system with prey refuge and Holling type III functional response, determine existence, uniqueness, positivity and boundedness conditions of the solutions of the model, stabilities of the equilibrium points and perform numerical simulations of the model. The methodology involves use of Lipschitz criterion, eigenvalues, Routh-Hurwitz criterion, Lyapunov technique as well as numerical simulations using MATLAB to find out the effect of prey refuge on the dynamical behaviour of the model. Results showed that creation of the reserved zones could be beneficial for survival and stabilization of multi-species interactions.

Keywords: *Food Web, Lipschitz, Prey Refuges, Functional Response, Stability, Holling Types.*

Of Virtual Libraries In-Service Delivery in Universities in Kenya

Kamau, G., & Ndinda, M.

¹Chuka University, Kenya, ²Egerton University, Kenya

Correspondence: gracemercykk@yahoo.com

Abstract

Virtual libraries are knowledge hubs that help in provision of information services to users. Universities have a key mandate to support teaching, learning and research. The full realization of this will only take place if libraries come into play. Virtual libraries offer timely and current information resources to users. This calls for advanced skills set among the library staff to ensure user needs are met. University libraries must therefore embrace technological changes and provide prompt and efficient services to users. This study aimed at establishing the relationship between virtual libraries and service delivery. The objectives were to assess utilization of virtual information services and establish strategies that enhance adequate service delivery. A quantitative research method using a descriptive survey approach was adopted and Egerton University library selected for the study. The target population for the study was 1000 users with a sample size of 278 obtained from Krejcie and Morgan table. Data was collected using online questionnaires using google form and analysed using descriptive statistics. Results showed that information provided through virtual library helps in timely service delivery to library users. There is need for total support of virtual libraries to ensure effective service delivery in university libraries.

Keywords: *Virtual Library, Virtual Services, Electronic Resources, Universities, Kenya*

**Use of Mobile Telecommunication Technologies in Access, Use, Transfer and Exchange of Agricultural Information among Small Scale Farmers in Rural Kenya,
Ol'jorok Sub-County, Nyandarua County**

Kimani, H., & Minishi-Majanja, M.K.

University of South Africa

Correspondence: *sherikayman@gmail.com*

Abstract

This paper is an excerpt from a doctoral study which aimed to investigate the use of mobile telecommunications technologies in the access, use, and exchange of agricultural information among small-scale farmers in Ol'joro-Orok Sub County, Nyandarua County, in order to determine how they can be incorporated into agricultural information systems to help farmers access agricultural information. The objectives of the study was to find out the mobile communication devices used by small-farmers, the types of information they accessed, factors that influenced the use of mobile communication devices in access, use and exchange of agricultural information and the challenges faced in using them. Rogers' diffusion of innovation theory guided the research. The study used a quantitative research approach and a descriptive survey design. Data was collected from 353 small-scale farmers and 7 agricultural extension officers in Ol'Joro-Orok Sub-county, Nyandarua county. Most of the farmers had mobile devices, which they used to obtain agricultural information, through SMS, mobile apps, emails, and voice messages. The most popular mobile devices were smartphones and traditional phones. There was no correlation between the use of mobile devices and age, gender, education among small-scale farmers. There was however a correlation between mobile device usage and device ownership. Factors that positively influenced small-scale farmers' use of mobile communications devices included availability of electricity, training, internet connectivity, availability of low-cost devices, ease of use of the devices, and ease of access to information, fellow farmers, family, friends and level of education. The challenges to mobile telecommunication use included poor internet connectivity, high mobile phone costs, lack of awareness, training, and electricity, as well as a lack of support from both the county and national governments. The increase in mobile communication devices penetration among small-scale farmers provides great potential for access, use and exchange of agricultural information. It is recommended that the County government should integrate mobile services with agricultural information systems to enhance distribution of agricultural information to small-scale farmers and construct data centers at the county level. The county government should also partner with the various stakeholders in solving the challenges experienced by farmers.

Keywords: *Agricultural Information, Mobile Services, Mobile Telecommunication Technologies, Nyandarua County Agricultural System, Ol'joro-Orok Sub-County; Small Scale Farmers.*

Development of a Mobile Application for Community Health Workers.

Ikuomola, A. J.

Olusegun Agagu University of Science and Technology, Nigeria

Correspondence: deronikng@yahoo.com

Abstract

Access to health care in low resource settings like slums, undeveloped area or devalued community is usually a major challenge and results from diverse reasons ranging from poverty, illiteracy and distance to providers of health care resources. Overtime health care agents known as community health workers (CHWs) were deployed as a remedy to alleviate the situation by bridging the gaps between communities, health and social service system, by navigating the health and human services system and educating communities on disease prevention. However, with the new development of the community health workers' deployment into the community setting, shortage of community health workers has been a major challenge. In addition, household and individual data collected are infrequently used to make timely informed decisions. There is need for development of a mobile application to enable community health workers to automatically send reports of daily, weekly and monthly activities, register patients and household online to facilitate effective and consistent communication between health workers and those in the community. A mobile application has been implemented with python programming language and kivy framework and MySQL was used for the database.

Keywords: Care, Community, Heath, Mobile, Worker.

An Assessment of the Influence of Reverse Logistics Practices on Solid Waste Disposal Management in Kisumu Town, Kenya.

Oyier, I. L., Nyagol, M., & Aleri, O.

Jaramogi Oginga Odinga University of Science & Technology, Kenya

Correspondence: loretaingrid@gmail.com

Abstract

Reverse logistics is a process that involves implementation, control, and planning of cost-effective flow of raw materials, finished goods, and in-process inventory. It is the flow from the point of consumption to the point of origin to ensure effective disposal and recapturing of value. Reverse logistics is a new practice in developing countries such as Kenya hence there is need to fully understand what it entails. The main purpose of this study was to assess the influence of reverse logistics practices on solid waste disposal management in Kisumu Town, Kenya. The three objectives were to examine the influence of backward flow of materials on solid waste disposal management, determine the influence of producers' involvement on solid waste disposal management and establish value recovery opportunities in solid waste disposal management. The study used three theories namely Closed-loop supply chain theory (main theory), third-party logistics theory, and resource advantage theory. The study used descriptive survey design. Descriptive survey design was used. The target population was 140 respondents comprising representatives of supermarkets, garbage collecting organizations, employees of the county government, producers, and small-scale hotels. A stratified random survey was used to sample 104 respondents. Data was collected using questionnaires and interview guides. Quantitative data was analyzed using descriptive and inferential statistics, which includes measures of variability and central tendency. Qualitative data was analyzed using thematic analysis framework. Reliability was ensured using the Cronbach Alpha that had a value of 0.7. Validity of the instruments was determined by the supervisors of the institution. Results showed limited adoption of backward flow of materials as a reverse logistics practice, that producers are not fully involved in the implementation and practice of solid waste disposal management and that solid waste disposal management practices in Kisumu Town have not been fully used to exploit value recovery opportunities. There is need to increase utilization of reverse logistics practices and implement reverse logistics practices to reduce expenditures, increase profitability, improve efficiency, and promote environmental sustainability in Kisumu town. There is also need for collaboration of major stakeholders in solid waste disposal in providing training on waste handling to reduce garbage collection fees and ensure affordability.

Keywords: Extended producer responsibility, recycle, refurbish, environmental sustainability, product life cycle

The Need for Improved Computer Vision Based Techniques for Strawberry Fungal Leaf Disease Classification

Kerre, D & Muchiri, H.

Strathmore University, Nairobi-Kenya

Correspondence Email: dkerre@strathmore.edu

Abstract

One of the key inputs to the Kenyan economy is agriculture, especially the entailing cash crops produced for the ready market locally and internationally. Strawberry is among the key cash crops grown in Kenya. This crop contributes to more than 50% foreign exchange earnings in the horticultural sector for the country. However, strawberry farmers in Kenya face the challenge of accurately classifying strawberry fungal leaf diseases. As a matter of fact, it has been reported that strawberry fungal leaf diseases contributed 19 % losses to the farmers. The most prevalent classes of the fungal leaf diseases are Strawberry leaf scorch, Strawberry leaf Blight and Strawberry leaf spot. The most commonly used method for the detection of these diseases is by the use of observation. This has led to misdiagnosis hence resulting to wrong measures being applied. Resulting from this is the need for a real-time and accurate technique for classifying the strawberry fungal leaf diseases. Computer vision techniques have been leveraged in the classification of the various plant diseases including those of strawberry. These techniques have exhibited several challenges which includes: the limited number of disease classes, model's failure to generalize on unseen data, failure of the models to classify the diseases at different stages especially at early stages, the models being based on images that do not capture various real environment scenario and the failure of the models to classify multiple fungal leaf diseases occurring on the same part of the plant. These inadequacies in the existing techniques, make them inapplicable in strawberry diseases classification in Kenya. In the following sections, the paper presents a review of computer vision based strawberry fungal disease classification techniques highlighting the major developments and weaknesses and finally the way forward in developing a solution for strawberry fungal leaf disease classification.

Keywords: Computer Vision, Disease Classification, Strawberry Fungal Leaf Diseases.

Nanocomposites for Determination of Pollutants in Wastewater

Mailu, S.

Machakos University, Kenya

Correspondence: smailu@mksu.ac.ke

Abstract

In Kenya, Cancer is estimated to be the second leading cause of non-communicable diseases related deaths after cardiovascular diseases and accounting for 7% of overall national mortality. Pollutants such as polycyclic aromatic hydrocarbons (PAHs) and hydrazine have been classified as human carcinogen by the Environmental Protection Agency (EPA). Human exposure to these pollutants has been found to damage the liver, kidney, lungs and respiratory tract system and has long-term effects on the central nervous system. It is therefore highly desirable to fabricate portable, economical, sensitive and rapid methodologies for the determination of polycyclic aromatic hydrocarbons and hydrazine. This work focuses on the methodologies of harnessing the unique properties of electro-conductive polymers and nanomaterials and their application in sensor technology. A highly sensitive, rapid and simple electrochemical sensor for detection of polycyclic aromatic hydrocarbons and hydrazine has been developed using graphenated polypyrrole-Ag-Au nanoalloys nanocomposite. Results showed that the synthesized nanocomposite exhibited excellent characteristics for their application in the development of highly sensitive, cheap and easy to use electrochemical sensors for hydrazine detection.

Keywords: Hydrazine, Nanoalloys, Cyclic Voltammetry, Carcinogen, Overpotential.

Web Application Rental System of Farm-Machinery (MRAF)**Korir, P.M., & Wasike, J.M.***Kirinyaga University, Kenya***Correspondence:** peacemarkcheruiyot7@gmail.com**Abstract**

Acquisition of farm machinery by farmers at all levels in Kenya has been a challenge. The problem is aggravated by the increased intensity and diversify of agricultural practices. Rental Web Application of Farm-machinery (RWAF) is the solution to the problem. This research aimed at developing a complete online rental system for use in agricultural sector to enable customers to book for farm machinery at the comfort of their homes without having to travel long distances to seek the services. The system development was based on SDLC with HTML, CSS, Bootstrap, JavaScript as the programming languages, while MySQL server and PHP were employed as the database of the system. HTML language was employed due to its easy to use and learn validation properties, while MySQL had better advanced features and properties such as security, open source and cross platform interoperability. The system was made of 10 modules that have the capacity to help customers to sign up, login, view the listed products add to cart book online and place orders after completion of transaction. The application also relieves farmers from the challenging task of booking products through physical visits to the property owners, while guaranteeing better management of property and accountability.

Keywords: *Web Application Rental System, Farm-Machinery (MRAF)*

Cloud Computing Usability Model for Quality University Education

Wasike, J. M.¹, Wabwile, P. N.²

¹Kirinyaga University, Kenya, ²Masinde Muliro University of Science and Technology, Kenya

Correspondence: jothamwasike@gmail.com

Abstract

Content delivery, communication and collaboration are associated with information Technology in University Education. To achieve these objectives, there is need for servers, storage and appropriate software in the universities and other educational institutions. Cloud Computing is based on Internet, whereby shared resources, software and information, are provided to computers and devices on-demand and works in an electricity grid-like fashion to support education. The more usable the cloud, the more efficient the task performance. The purpose of this research was to investigate and analyze cloud computing usability attributes, and then develop a cloud computing usability model for quality education. The study objectives were to identify university education quality parameters, establish cloud computing usability attributes which may affect implementation of cloud technology, develop applicable cloud computing usability model for university education and a tool to assess how the model impacts on delivery of quality of university education. The research adopted pragmatism philosophy, employing a case study research method based on universities in Kenya. Purposive sampling was used with an estimated sample size of 65 respondents. Data was collected using semi-structured interviews and questionnaires to deliver a cloud computing usability model and a tool to assess acceptability of cloud computing in universities. This research makes a significant contribution to the scientific knowledge through establishment of cloud computing user satisfaction attributes in line with parameters for quality university education and in terms of the cloud computing usability model.

Keywords: *Cloud Computing, Usability Model, Quality, University Education.*

Porous Carbons Derived from Lignin: Applications for Supercapacitors and Oxygen Reduction Electrocatalysts in Neutral Media

Mutuma, B. ^{1,2*}, **Ndeye ,F. S.** ¹, **Amanda, B.** ¹, **Ndeye, M. N.** ¹, **Santoro, C.** ³, **Brilloni, A.** ⁴, **Poli, F.** ⁴, **Soavi, F.** ⁴ **Manyala, N.** ¹

¹*University of Pretoria, Pretoria, South Africa*, ²*Kirinyaga University, Kenya*, ³*University of Manchester, United Kingdom*, ⁴ “*Giacomo Ciamician*”, *Alma Mater Studiorum – Universita' di Bologna, Italy*.

Correspondence: bmutuma@kyu.ac.ke

Abstract

Porous carbons are receiving great attention by scientists due to their tunable physicochemical and textural properties. In this work, lignin was activated with potassium bicarbonate (KHCO_3) in order to generate porous carbons via a one-step carbonization route. The lignin-to- KHCO_3 ratio affects the performance both in supercapacitors and oxygen reduction reaction (ORR) electrocatalysis. The lignin-derived carbons obtained at lignin/ KHCO_3 mass ratios of 1:0.5 (LAC-0.5) and 1:2 (LAC-2) comprised of mesopores and micropores displaying BETs of $1558 \text{ m}^2\text{g}^{-1}$ and $1879 \text{ m}^2\text{g}^{-1}$, respectively. LAC-2 electrode material exhibited a superior specific capacitance in 2.5 M KNO_3 electrolyte. A symmetric supercapacitor with LAC-2 electrodes was built displaying a specific capacitance of 28.5 F g^{-1} . This value corresponds to an electrode specific capacitance of 114 F g^{-1} and a specific energy of 10 Wh kg^{-1} with a corresponding specific power of 397 W kg^{-1} . Durability tests showed that the device was able to maintain a capacitance retention of 84.5% after 15,000 charge-discharge cycles. The lignin-derived carbons were also studied as electrocatalysts for ORR in a neutral medium. The LAC-2 showed higher electrocatalytic activity and superior ORR performance than LAC-0.5. The interconnected porous network and the high surface area made the lignin-derived porous carbons suitable electrode materials for dual applications.

Keywords: *Porous Carbons, Lignin, Supercapacitors, Oxygen Reduction Electrocatalysts Neutral Media.*

Secure Management of Encryption Keys for Small and Medium Enterprises in Africa: A Comparative Study

Mwikya, J.¹, Karani, J.², Obura, J.³

^{1,2} Kirinyaga University, Kenya, ³Bomet University College, Kenya

Correspondence: jmwikya@kyu.ac.ke

Abstract

Some small and medium enterprises embed their encryption keys and other software secrets directly in the source code for applications that use them, thereby introducing the risk of exposing the secrets. Today, there are multiple systems for managing keys. However, it can be hard to pick a suitable one. The objectives of the study were to identify available key management systems for securing secrets in software, evaluate their suitability for use by small and medium businesses based on various attributes and recommend a best practice to configure the most suited system for managing software secrets. The study identified key management systems that were compared against a set of requirements created from a small and medium business perspective. The systems that fulfilled the requirements were implemented and comprehensively evaluated through SWOT analyses based on various attributes. Each system was then scored and compared against each other based on these attributes. A summary of best practice guide for the most suitable key management system was established. During the study a total of 15 key management systems were identified with various features and purposes. Out of these 15 systems, five key management systems were comprehensively compared. These were Pinterest Knox, Hashicorp Vault, Square Keywhiz, OpenStack Barbican, and Cyberark Conjur. Out of these five, Hashicorp Vault was deemed to be the most suitable system for small and medium enterprises in Africa.

Keywords: *Secure Management, Encryption Keys, Small and Medium Enterprises, Africa*

COVID-19 Forecast using Machine Learning Techniques

Kirori, Z., & Ireri, E.

Jomo Kenyatta University of Agriculture and Technology, Kenya

Correspondence: zkirori@gmail.com

Abstract

Coronavirus disease (COVID-19), is a serious disease affecting countries world over. The viral nature of this outbreak makes its bio-chemical predictability almost impossible and hence no immediate probability of a known cure. Thus, medical researchers are left with no choice but to control new infections through vaccines. Within academia deep machine learning techniques are assisting in developing predictable models based on time-series data. This study is yet another milestone in forecasting the confirmed COVID-19 infection rates and related deaths. The gated recurrent unit (GRU) - a specialty of the long short-term memory (LSTM) deep machine learning model was used on selected time-series data. The results indicated that GRU achieved great performance in each of the predictions.

Keywords: *Covid-19 Forecast, Machine Learning Techniques.*

Legislative and Policy Regime on Information & Knowledge Sharing through indigenous Knowledge in Kenya: A Review of Literature

Maina, S.

Kirinyaga University, Kenya

Correspondence: smaina@kyu.ac.ke

Abstract

Legislative and policy on information and knowledge enhances information sharing which is considered a valuable avenue to increasing organizational efficiency and performance. In the 21st century, there have emerged new technologies in information and communication which have shaped the process of sharing information across organizations. In Kenya, the government has put in place some legislation and policies to regulate information sharing in various sectors of the economy. However, information sharing is a critical task as legislation and policies cannot fully control sharing of information. Kenya's Constitution explicitly provides for access to information through enactment and implementation of an access to information law. With the emergence in use of electronic resources, implementation of copyright law, licensing, and other information laws have changed drastically. This article will review the implementation of electronic resources and how it impacts on provision of information and knowledge sharing including procurement and collection development. Legislative and policy issues to be considered will include copyright, licensing, and database protection. This study aims to conduct a review of literature in legislative and policy regime on information and knowledge sharing in Kenya with the view to understanding their impact in the digital era and how the role of information professionals, policies, and other legislative factors contributing to enhancement of information and knowledge sharing.

Keywords: *Legislative, Policy Regime, Information, Knowledge Sharing, Kenya.*

Assessment of Total Quality Management on Performance of Academic Library at Chuka University
Kamau, G.¹, Wasike, J.²

¹Chuka University, Kenya, ²Kirinyaga University, Kenya

Correspondence: gracemercykk@yahoo.com

Abstract

Academic libraries are service oriented institutions whose focus is to fulfill users' needs and also expect their demands. Library patrons have different information needs that if not effectively attended to, can lead to information obesity especially in the current massive information available on the internet. This therefore calls for total quality service provision in libraries with ongoing improvement. Total quality management (TQM) ensures that all members of the organization work together to continuously improve the processes, products, services and the culture in which they operate. This leads to long-term success through customer satisfaction. The study sought to assess application of total quality management on performance of library operations at Chuka university library as three objectives namely to identify TQM practices employed at Chuka University library, determine the relationship between TQM and performance at Chuka University library and establish TQM strategies that improve performance at the University library. Mixed methods using an online survey questionnaire and interviews were used for data collection from a total sample of 200 respondents comprising library staff and the library users. Quantitative data was statistically analysed while qualitative data was analysed using thematic analysis. Library management at Chuka university employs total quality management that includes provision of quality and timely services, time management and operational information systems ensuring effective operations and service delivery to users. In order to ensure effective total quality practices for improved performance in academic libraries, effective communication, fact based decision making, strategic and systematic employee involvement and good leadership are necessary.

Keywords: *Library, Performance, Total Quality Management, University, User Satisfaction*

Digital Technology in Managing Continuity for Sustainable Growth in Institutions of Higher Learning

Ngereki, A. M.¹, Ngorobi, W.²

¹ Chuka University, Kenya, ² Kirinyaga University, Kenya

Correspondence: ngereki@chuka.ac.ke

Abstract

Digital technology dates back to the 1940's with the development of computers then only known as the machine. Since then, computerization has proven to be a disruptive technology forcing restructuring of organizations to incorporate computer based systems in a bid to remain relevant and competitive in an ever evolving world. Emergence of life threatening pandemics such as COVID 19 that demands change of person to person interaction further places digital technology as an irreplaceable alternative in the redefinition of modus operandi for organizations and especially institutions of higher learning in the delivery of their core services. In this paper we perform a systematic review of the use, perception, readiness, challenges and knowledge of digital technology among stakeholders of institutions of higher learning in Kenya. We rely on online questionnaires to collect and analyze responses from students, university management, lecturers, university support staff and select interested parties in the performance of institutions of higher learning in Kenya. Results showed that universities in Kenya have quickly adopted and given extra relevance to the use of digital platforms such as e-learning portals and web conferencing, in the delivery of their core mandate unlike previous approach where physical contact was given preeminence. Users agree that universities have made e-learning platforms more available, accessible and pervasive in addition to necessary user training to ensure that universities continue to offer quality, affordable and timely services to their clients. Further, our investigation shows that although different universities remain autonomous and self managing, the digital platforms installed remain largely similar and extensible. Users of these platforms strongly advocate for regular training and workshops to build confidence and expertise in the use and interaction of installed digital technology by different universities. There is need for joint workshops on access, security and interaction of different digital platforms in place by different universities to adequately equip current, potential and future users with the confidence and adeptness to successfully embrace digital technology in support for continuity and sustainable growth in institutions of higher learning.

Keywords: Digital Technology, Universities, Digital Access and Security, Web platforms, E-learning.

Evaluation of AquaCrop Model in Wheat Production Under Zero and Conventional Tillage Practices in Laikipia, Kenya

Mutonga, M.¹, Kipkorir, E.², Ngetich , W.³

¹*Kirinyaga University, Kenya*, ²*Moi University, Kenya*, ³*University of Eldoret, Kenya*

Correspondence: mmutonga@kyu.ac.ke

Abstract

AquaCrop is a computer based water productivity model used to predict growth, development and yield of agricultural crops. Despite the wide application of the model in scenario analysis, it has not been used in zero tillage. This study aimed to calibrate and validate AquaCrop model on wheat crop yield under conventional and zero tillage practices for ASAL climatic condition of Laikipia County. Evaluation was based on field experiments set up at Lengetia farm in Laikipia East sub-County. Field trials were carried out with two tillage treatments, zero tillage (ZT) and conventional tillage (CT) and four varying sowing onsets dates namely early (SD1), normal (SD2), late (SD3) and a control treatment with supplemental irrigation under normal sowing dates (WTSD2). This was laid out in a randomized complete block design in split plot arrangement in three replicates. Calibration was done using the control treatments while validation was done based on comparison between simulated and observed data from the field trials. The model performance in simulating canopy cover (CC %), biomass (B in ton/ha) and soil water content (SWC, mm) was evaluated using statistical indices root mean square error (RMSE), Willmott's index of agreement (d), coefficient of determination (R^2) and Nash-Sutcliffe model efficiency coefficient (EF). The value of R^2 of 0.95, 0.80 & 0.51 respectively for calibration of CC, B and SWC were obtained for conventional tillage and R^2 of 0.88, 0.87 & 0.50 in validation. In zero tillage, calibration was not satisfactory especially in simulating soil water content ($R^2= 0.13$). This was attributed to the improvement in soil hydraulic properties through zero tillage practice. This limited the model application in zero tillage hence the need for additional measures on improved hydraulic properties of soil and crop response under Zero tillage.

Keywords: *Zero Tillage, Model Performance, Moisture Regimes, Lengetia Farm, Laikipia County, Hydraulic Properties.*

Re-Engineering of Information Services through Partnerships and Collaborations in University Libraries: The Case of Moi University, Nairobi Campus Library and American Embassy, Kenya

Mukoma, C.¹, Mwai-Okeyo. E.², Kiplang'at, J.³

¹Kenyatta University, Kenya, ²Moi University, Kenya, ³Africa International University, Kenya

Correspondence: mukoma.catherine@ku.ac.ke

Abstract

The paper reports on the opportunities and benefits of re-engineering information services through partnerships and collaborations using a case of lessons learnt and experiences gained through collaboration and partnership between the Moi University, Nairobi Campus, and the Public Affairs Department of the US Embassy. The mutual benefits through the partnership are many and varied. Some of these benefits include youth empowerment, grants, sharing resources, capacity building and trainings among others. The lessons learnt and experiences are beneficial to university libraries as they re-engineer their information services and products amidst dwindling budget and ever-changing information landscape. Moi University, Nairobi campus and the American Embassy entered a partnership that saw the library enriched with devices, programs and trainings in information access and dissemination. The exposure to new devices enhanced the information services especially to the techno savvy users. Devices such as chrome books were used for the first time in a university library in Kenya. This paper therefore outlines the mutual benefits and gains realized through the partnership and how this impacted on information services at Moi University, Nairobi campus library. The paper proposes a framework and makes recommendations to improve collaboration and partnership in academic libraries in Kenya. The authors share their hands on experiences while offering services at the American Space located at Moi University Nairobi Campus.

Keywords: *Partnership; Collaboration; Re-engineering; Information Services; dissemination; Networking; Technology; Chrome Books; Kindles.*

A Review of Skills in Adoption of Big Data

Mithanga, F & Wasike, J

Kirinyaga University, Kenya

Correspondence: fmithanga@kyu.ac.ke

Abstract

Adoption of big data has happened over time. During the past decade much research has been done on data and its growth. Big data has become invaluable in enabling personalized deals, real-time alerts and predictive maintenance with digital information created annually growing by 44 percent from 2009 to 2021. Big data is massive, messy and growing very fast, however it is impossible to analyze it with tradition methods, yet harnessing information which is a primary factor of production in the new millennium means that the four "V" s' of data have to be effectively planned for. This study seeks to address the challenges of data driven decision making in firms. The study objectives are: Review of big data challenges and skills shortage in big data. The design adopted for the research was survey. Sampling was done using non-probability technique. Data was collected through desktop research and analyzed using SPSS. The adoption of big data gives insights to business if users know how to use it. The research concludes output and productivity is increased by firms that address skills as one of the challenge in big data. Companies that deal with big data challenges have reaped enormous benefits from data science.

Keywords: *Big data, Velocity, Veracity, Variety and Volume*

SUBTHEME: ENGINEERING & TECHNOLOGY**A Review of Early Interventions for Creation of Interest in STEM Education****Gachoki, N, Musima, S, L.Mbaabu, L , & Mwai, M.***Kirinyaga University, Kenya***Correspondence:**ngachoki@kyu.ac.ke**Abstract**

Increasing worldwide need for scientists and engineers has pushed various countries to develop initiatives for promoting Science, Technology, Engineering and Mathematics (STEM) education in elementary and secondary education levels. It is expected that early exposure to science tends to increase interest in science-related careers later in life. This paper reviews various methods employed for integration of STEM education to the existing curriculums.

Some of these programs are developed in partnership between educators, policy makers, and communities while others are government promoted directives and some are initiatives of institutions and universities.

The paper also presents some of the initiatives promoted in Kenya and concludes with proposals of what could be done to promote interest in STEM careers in elementary and secondary schools in Kenya.

Keywords: STEM Education

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

Mwai, M¹, Gichane, M², Thimo, L³, Mwai, A⁴, Sirengo, H⁵

^{1,3}Kirinyaga University, Kenya ^{2,4}Dedan Kimathi University, Kenya, ⁵Starehe Girls Center, Nairobi, Kenya

Correspondence: moses.mwai@yahoo.com

Abstract

The novel Covid-19 virus has become a global pandemic with devastating and far-reaching consequences. The sanitization of hands and monitoring of body temperature have become part of our daily lives and have been adopted by the World Health Organization (WHO) as key guidelines in battling the pandemic. In public institutions where large groups of people interact, temperature monitoring and hand sanitizing needs to be quick and low cost for it to be effectively implemented. To address the above issues, this paper discusses the development of a solar powered automated low-cost non-contact temperature scanner and sanitizer. A microcontroller-based device was designed and implemented, capable of checking temperature and dispensing hand sanitizer to the user without physical contact with the device. Experiments were conducted to ascertain the reliability of the solar power system to run the device and the functionality and experiment results are highlighted in subsequent sections.

Keywords: Microcontroller, Covid-19, Hand sanitizer, Ultrasonic sensor, Temperature Scanner

Jatropha Curcas Oil Combustion in Internal Combustion Engines Under Oxy-Fuel Conditions: A Review

Ogari, A.N & Bosire, R.N

Kirinyaga University, Kenya

Correspondence: rbosire@kyu.ac.ke

Abstract

The world is facing a two-fold energy crisis; depletion of non-renewable energy sources and pollutant emissions from fossil fuel use. It is therefore necessary to come up with renewable energy resources in addition to coming up with efficient methods of utilizing the available energy resources. To curb this, renewable energy sources such as the use of Jatropha oil has been fronted to be used in internal and external combustion engines. The objective of the study was to analyze the properties of jatropha oil. Combustion characteristics of the oil under air/fuel and oxy/fuel environment was studied. Laboratory experiments as well as system modelling was done. ANSY-Effluent simulation software was used. Literature has shown that Jatropha curcas oil has comparable physiochemical properties as those of diesel oil and therefore it is a suitable substitute for the fossil fuel in both internal and external combustion engines. Combustion of Jatropha oil in an oxy-fuel conditions led to a 26% NOx reduction as well as up to 70 % heat loss reduction as compared to that of the air/fuel combustion. The spray flame and emissions of Jatropha -diesel blends burning in oxy-fuel conditions showed that the emission parameters and flame temperature are higher in diesel than in diesel/jatropha blends by figures in the range of 18 %.

Keywords: Fossil Fuel, Jatropha Oil, Oxy-Fuel Combustion, Internal Combustion Engines, Green House Gas Emissions

Impact of Karatina Sewer Stabilization Ponds on Biological and Physico-Chemical Properties of Water Along River Ragati in Nyeri County, Kenya

Mwandiki, M. C¹, Gichumbi, J.M², Kiruki, S³, Fredrick O. Ogolla, F.O⁴

Chuka University, Kenya

Correspondence: cmwandiki@gmail.com

Abstract

River Ragati is an important habitat for diverse species of organisms, plants and micro-organisms. The Ragati River is surrounded by a rural and urban setting that has a population of over 158, 960 people. Though there is a sewerage treatment plant at Karatina Town, there is scanty information on the efficiency of stabilization ponds and the impact of the sewer discharge on River Ragati. The objective was to determine the variation in the total and faecal coliforms concentrations in effluent entering and being discharged from the stabilization pond in Karatina sewerage treatment plant in, Nyeri County in Kenya. The study was undertaken on River Ragati ecosystem during dry and wet seasons using quasi-experimental design. Data was analyzed using Scientific Analysis System (SAS) version 9.4. Wastewater quality parameters improved from one sedimentation pond to the next towards discharge. Total coliform and faecal coliform bacteria were significantly ($p < 0.05$) affected by seasons of the year. The levels of total coliform in the sewerage treatment plant ranged from 7.61 to 774.16 cfu/100ml and 10.453 to 1500 cfu/100ml during dry and wet season respectively. The levels of faecal coliform bacteria ranged from 3.91 cfu/100ml to 74.19 cfu/100ml and 7.23 to 105.87 cfu/100ml in dry and wet season respectively. Levels of total coliform and faecal coliform bacteria was not significantly ($p > 0.05$) different in different sampling points of River Ragati during dry and wet seasons. However, the level of total coliform bacteria significantly ($p < 0.05$) differed with seasons. Based on the findings, Karatina sewerage treatment plant had no effect on River Ragati in terms of coliform constituents. This study bridges the knowledge gap on the performance of Karatina sewerage treatment plant and its impact on River Ragati.

Keywords: Ecosystem, coliform, stabilization ponds, total coliform, faecal coliform, effluent

Keywords: *Karatina Sewer, Stabilization Ponds , Biological , Physico-Chemical Properties , Water , River Ragati In Nyeri County, Kenya*

Mathematical Models for Predicting Solar Irradiance at a Site for Milk Solar Refrigeration Systems

Wainaina, P.M , Njue, M.R, & Owino, G

Egerton University, Kenya

Correspondence: [*pwainaina@kyu.ac.ke*](mailto:pwainaina@kyu.ac.ke)

Abstract

The mismatch between solar energy availability and the cooling load energy demands for AC solar refrigeration systems in different geographical locations complicates the design and sizing of milk solar refrigeration systems components. This is caused by variation seasonal solar insolation and different levels of global solar insolation. In this study, three different sizes AC milk solar refrigeration systems, have been investigated for maximum cooling loads developed from the refrigeration systems when exposed to varying levels of solar insolation in Nakuru Kenya. Regression models were developed for predicting maximum cooling loads delivered from the milk solar refrigeration systems based on available mean daily solar insolation of the location. The predictive models developed forms as useful tools in the design and sizing of milk solar refrigeration components based on solar insolation available at any global location. Three Solar refrigeration systems were fitted with AC reciprocating compressors of capacities'; 350 W, 250 W, 200 W and were investigated for maximum cooling loads under varying mean daily solar radiations. Four PV panels each of 200 Wp connected via an inverter provided the power required to operate the compressors in each of the refrigeration system. An innovative control unit operated the refrigeration systems dependent on the solar insolation level available in the day. Temperature profiles of water placed in the central water can, and the amount of ice formed were used to determine the maximum cooling load of each refrigeration system with, based on solar radiation available. The regression cooling curve generated by each system was used in developing the mathematical cooling load prediction models based on available solar insolation of Nakuru . The results showed that the maximum cooling loads obtained from the solar refrigeration systems dependent on the annual mean daily solar insolation of a specific location and the capacity of the refrigeration system compressor. The mathematical models showed a strong correction of coefficient of between 0.958 and 0.908when validated with actual solar refrigeration cooling loads.

Keywords: *Cooling Loads; Solar Insolation; AC Solar Refrigeration System*

Analysis of Urban Sprawl Patterns Around Eldoret Town Using Object Based Image Analysis.
Odhiambo, S, Mwasi, B & Ngetich, J.

University of Eldoret, KENYA

Correspondence: samson.odhiambo@uoeld.ac.ke

Abstract

One of the most rapidly growing urban phenomena in the 21st Century is emergence of sprawling settlements. Such settlements provide essential services as well as some strain on these centers. Controlling and managing growth of such settlements is necessary in order to maximize the services they provide and mitigate against the stresses they cause on environment. This requires an understanding of both spatial and temporal sprawling patterns and factors that control them. Satellite remote sensing plays a vital role in studying urban growth and sprawl patterns. However, despite most sensors delivering medium and high resolution satellite imageries, a great percentage of applications still rely on basic image processing techniques. The techniques overlook variations in soft classifiers, sub-pixel classifiers and spectra un-mixing. This study therefore used classifiers that combine spectral and structural characteristics, involving object based supervised classification algorithms, to extract temporal land use/cover data from set of high resolution Sentinel-2 imageries of 2016 and 2020 and pan-sharpened Landsat 7 ETM+ of 2000, to determine urban sprawl growth patterns around Eldoret town in the study area. The post-classification change detection approach was used to compare 2 sets of satellite images of 2000-2016, 2016-2020 and 2000-2020. In addition, Analytical Hierarchy Process (AHP) was used to ranks factors, and related them with growth patterns through overlay analysis in order to isolate the important factors that support urban sprawl patterns. The identified significant factors were then used for generating factor maps through Multi Criteria Evaluation (MCE). Finally, the Cellular Automata (CA)-Markov model was used to simulate future sprawl patterns. The results revealed that built-up areas increased by 67.32 km², while agriculture/farmlands increased by 676.16 km² from 2000 to 2020. When AHP model was used for ranking the factors, distance to road with 27.93% contributed more to sprawling patterns followed by distance to powerline with 17.37%, distance to waterline with 17.08%, distance to employment centers was 11.38%, population density 10.36%, distance to restricted areas 6.02% with elevation and slope tying with 4.94% each contributing least to sprawling patterns. The CA-Markov chain model predicted that built up areas would increase by 15.01 km² in 2020 to 2029. The study recommends that policy makers and planners should carry out forward planning of areas and provide requisite infrastructure ahead of development.

Keywords: *Urban Sprawl Patterns, Eldoret Town, Object Based Image Analysis.*

SUB THEME: AGRICULTURE**Influence of Land Size On Household Food Security in the Tea Zones of Kirinyaga County****Kamau, J. W., Munyua, C. N. Kamuru, S. M.***Egerton University, Kenya***Correspondence:** janeckamau35@yahoo.com**Abstract**

Food is recognized as a basic human right and inadequate food consumption has serious implications for general body health and well-being, growth, development and cognitive ability. This implies that food insecurity, a condition in which a population does not have access to sufficient, safe and nutritious food over a given period to meet dietary needs and preferences is a threat to overall human well-being and efforts geared toward poverty reduction and economic growth. A guarantee of household food security requires adequate home production of food and/or adequate economic and physical access to food. Smallholder farmers in the tea zones of Kirinyaga County have converted most of their land into tea production, while food crop production has been on the decline. Nevertheless, the extent to which this trend has affected food security is not clear. This study examined the influence of land size on household food security in the tea zones in of Kirinyaga County. Descriptive research design was applied and primary data collected through administration of questionnaires and analyzed using descriptive statistics and Chi square test of association. There was a significant association between household land size and food security. There is need to put in place measures to address household food security

Keywords: *Household, Food security, Land size.*

Is there a Mismatch between Perceptions of Climate Change Variability and Adaptation Practices amongst Smallholder Farmers in Mount Kenya Region?

Maina, P. N. D.

St. Pauls University, Kenya

Correspondence : mainapaul72@gmail.com

Abstract

According to demographic predictions, mountainous environments are found in over half of the world's countries. According to the Food and Agriculture Organization of the United Nations, mountain ecosystems are home to over 850 million people and supply critical ecosystem services such as water for domestic use, agriculture, industry, and power generation to more than half of the world's population. The objective of the study was to determine the perceptions of climate change variability and adaptation practices amongst smallholder farmers in the Mount Kenya region. The research presents an overview of smallholder farmers' perception of climate change where items were used to measure the concept of climate change variability among 453 smallholder farmers in Mt Kenya west. Temperature and rainfall were used to construct an index for climate change using Principal Component Analysis (PCA). ANOVA test results ($p<0.05$) confirmed a statistically significant difference in smallholder farmers' perception of climate change across the three forest blocks, gender, and Socioeconomic Status (SES). The study further established a significant level of awareness of climate change among smallholder farmers and a relatively slow approach to utilization of non-timber forest products (NTFPs). This confirms the disparities among smallholder farmer's perceptions on climate change and adaptation practices. There is a need to formulate the consultative, pragmatic, and responsive policy framework to balance forest conservation and forest adjacent community's user rights.

Keywords: *Climate Change, Forest Adjacent Communities, Mountain Ecosystems, Variability, Vulnerability, Community Development*

Genome-Wide Identification and Expression Profiling of Myb Transcription Factors in Radish (*Raphanus Sativus L*)

Muleke, E. M'mbone^{1*}, Yan, Wang^{1*}, Zhang, Wan-ting^{1*}, XU, Liang¹, Ying, Jia-li¹, Karanja, Bernard¹,
Zhu, Xian-wen², Fan, Lian-xue¹, Ahmadzai, Zarwali¹, Liu, Li-wang¹

¹National Key Laboratory of Crop Genetics and Germplasm Enhancement, Key Laboratory of Horticultural Crop Biology and Genetic Improvement (East China) of Ministry of Agriculture and Rural Affairs, College of Horticulture, Nanjing Agricultural University, Nanjing 210095, P.R. China

²North Dakota State University, Fargo, ND 58108, USA

Correspondence: emmbone@mmust.ac.ke

Abstract

The myeloblastosis viral oncogene homolog (MYB) are a family of proteins that represents a broad class of transcription factors, that are key regulators of several vital plant processes including biosynthesis of anthocyanins. Although MYBs are well studied transcriptional factors, there are no comprehensive reports on studies on MYB family of radish (*Raphanus sativus*) reported in literature. Genome-wide analysis of MYB genes in radish (RsMYBs) was conducted which included; identification of putative MYB members, analysis of their phylogenetic relationships, motif analysis, gene structures, GO annotations, chromosome locations and transcript profiling of MYBs involved in anthocyanin biosynthesis. A total of 187 RsMYBs were identified and clustered into 31 subfamilies after phylogenetic analysis. The repeat3 (R2R3) encoding MYB genes maintained a conserved gene structure having three exons and two introns, against six exons and five introns in genes encoding R1R2R3 repeats proteins. MYB gene sequence analysis led to identification of conserved and over-represented cis-motifs. In addition, motif analysis also revealed that gene function could be associated with the number and organization of conserved domains. Subsequently, transcript profiles of 14 RsMYB genes which could be involved in anthocyanin biosynthesis were analyzed throughout taproot development of four different coloured radish. Results showed that transcript levels of most RsMYBs were enhanced in pigmented tissues and more so at the maturity stage of radish. This study also established that phenotypic and spatial temporal variation of anthocyanin in radish could to a large extend be attributable to RsMYB131, RsMYB132, RsMYB65 and RsMYB172 genes, alongside the role of potential repressors like RsMYB117, RsMYB38 and RsMYB41. This study further demonstrates that anthocyanin in the leaves of radish is possibly regulated by RsMYB159 and RsMYB129. This observation provides a vital information for further functional research into the MYB gene family in radish and a possible elite target genes for enhanced anthocyanin in radish.

Keywords: *radish, MYB transcription factors, anthocyanin biosynthesis, Myb Transcription, Radish (Raphanus Sativus L) expression profiling.*

Prevalence of Nematode Genera and Trophic Groups Associated with Tomato Crop in Mwea West Sub-County, Kirinyaga County, Kenya

Mwangi, M.W¹ & Muiru, W.M²

¹Nairobi Technical Training Institute Nairobi, Kenya

²University of Nairobi, Kenya

Correspondence: *wanjirumargie00@gmail.com*

Abstract

Tomato is a major source of income for large and small-scale farmers in Mwea West Sub-county, but pests and diseases threaten its cultivation. Root knot nematode (*Meloidogyne* spp.) cause huge yield losses. A survey using questionnaires among 218 randomly smallholder farmers was conducted to establish the prevalence of root-knot nematode (RKN) in the tomato fields. A second approach, involved carrying out analyses of soil samples to establish the genera and nematode feeding groups present and also determine their relationship to soil physico-chemical properties. Out of one hundred and nineteen soil samples collected, nematode abundance, genera and trophic group were determined. Organic carbon, pH, total nitrogen, cation exchange capacity, phosphorous and potassium levels were established. Root-knot nematodes belonging to *Meloidogyne* spp. and diseases such as late blight were among diseases were reported. Farmers rated prevalence of RKN at 3.8%, while frequency of isolation was much higher at 67.2%. Other genera of plant parasitic nematodes that were frequently isolated were *Tylenchus* spp. and *Pratylenchus* spp. Plant parasitic nematodes and bacteriovores were the most abundant nematode trophic groups at 51.46% and 33.42% respectively. The trophic groups were only weakly correlated (correlation coefficient < 0.5) with soil factors (pH, Potassium, clay, sand and Nitrogen). *Meloidogyne* spp. is the most damaging of the plant parasitic nematodes and is a potential threat to tomato production in the area. *Tylenchus* spp. also isolated from most farms has potential to cause damage to the crop.

Keywords: *Bacteriovores, Fungivores, Predators/Omnivores, Meloidogyne spp., Plant Parasitic, Root-Knot Nematode (RKN), Soil Physico-Chemical Properties.*

Nematode Community Assemblage in Maize Agroecosystems: A Valuable Bioindicator Tool for Agro-Ecosystem Health

Maina, S., Karuri, H.

¹University of Embu, Kenya

Correspondence: samuelthaithi92@gmail.com

Abstract

Maize is an important staple food crop consumed in Kenya and Africa. Plant-parasitic nematodes are a major constraint in maize production. On the other hand, free-living nematodes provide key ecological functions. These nematodes may be affected by climate change. The aim of this study was to assess the nematode soil food web structure in maize agroecosystems in Kirinyaga County, Kenya in order to understand the potential role of predatory nematodes in suppression of plant-parasitic nematodes in a changing climate. Soil samples were collected from maize fields in Gichugu, Kirinyaga Central, Ndia and Mwea sub-counties in Kirinyaga County. Fifty nematode genera were identified across the sub-counties with *Pratylenchus*, *Cephalobus*, *Heterocephalobus*, *Aphelenchus*, *Labronema* and *Nygelaimus* being the most predominant genera in their respective feeding guilds. The highest enrichment index was recorded in Gichugu sub-county. Nematode functional metabolic footprints based on enrichment index and structure index characterized Mwea as a degraded ecosystem, while Gichugu, Kirinyaga Central and Ndia were structured. Results provide valuable information on soil food web structure and function in maize agroecosystems in Kirinyaga County, and highlight the potential role of organic amendments in suppression of plant-parasitic nematodes in maize. Based on these findings there is urgent need for increased resources to support reduction of the herbivorous nematode pressure in maize agro-ecosystems in Mwea sub-county, while considering the effects of climate change, soil properties, and farming practices – that are required by higher nematode trophic groups.

Keywords: Metabolic Footprints. Structure Index. *Zea mays L*

Sustainable Approaches for Community Involvement in the Conservation and Management of Dryland Forest and their Biodiversity: A Case of Kijege Forest, Tharaka Nithi County, Kenya.

Kiria, E., Onundo, K.

Chuka University, Kenya

Correspondence : ekiria@chuka.ac.ke

Abstract

Community involvement is central in management and conservation of forests as they depend on these forests for livelihood and cultural values. Dryland forests are among the vital ecosystems but they face degradation due to undervaluation by surrounding communities even though they supply a range of important resources. This study aimed at determining sustainable approaches for community involvement in management and conservation of Kijege forest and its biodiversity. The objectives were to determine the importance and values of Kijege forest to community, the role of community involvement in management, sustainable approaches for community involvement in conservation and management of the forest and its biodiversity. The study targeted local inhabitants. Feedback was obtained from sixty randomly sampled households. Interviews were conducted with the KFS officials, village elders and other relevant leaders as key informants. Although 90% of the respondents depended on the forest for their livelihoods, especially for supply of wood fuel, and pasture during dry seasons, only 6.7% have ever, or are being involved in management of the forest. From the findings, it is clear that the level of involvement of community members is very low, hence the need for formation of Community Forest Association, capacity building at community level and formulation of a Forest management plan to oversee sustainable involvement of the formed CFAs for better conservation and management of the forest and its biodiversity.

Keywords: *Sustainable Approaches, Dryland forest, Conservation, Management, Communities, Involvement*

Influence of Rhizobium Inoculation and Phosphate Rock Fertilizer Application on Growth and Yield Components of Green gram in Tharaka-Nithi County, Kenya

Mbaka F. K¹, H. O. Ndukhu, H.O¹, Oloo-abucheli, G.O¹

Chuka University, Kenya

Correspondence: mbakafelister@gmail.com

Abstract

Green gram is an important drought tolerant grain legume crop in Kenya. In Tharaka Nithi County green gram is as a major source of food security. There is therefore need for a cheap and sustainable system of agricultural production to increase its production. The legume/*Rhizobium* symbiosis in combination with phosphate rock offers a natural system for improving green gram nitrogen fixation. This study was aimed at determining the effect of *Rhizobium* and phosphate rock fertilizer application on growth and yield attributes of N26 and KS20 varieties. The study was carried out at Chuka University Horticultural Research Farm for two seasons, November 2019 to January 2020 and February to April 2020. Factorial experiment of 2x2x2 was laid out in a Randomized Complete Block Design (RCBD). There were three factors, variety (N26 and KS20), phosphate rock (0 and 30 kg P ha⁻¹) and *Rhizobium* MEA 716 (0 and 100 g ha⁻¹). The experiment contained eight treatments which were replicated three times. Data was collected fortnightly on four randomly selected plants on parameters such as plant height, number of leaves, branches, pods, total dry biomass, shoot and root dry weight and grain yield and analyzed using Statistical Analysis Software (SAS). Significant means were separated using Least Significant Difference (LSD) at probability level of 5%. Results for both seasons indicated that combined application of *Rhizobium* MEA 716 *Rhizobium* 100 g ha⁻¹ and phosphate rock 30 Kg ha⁻¹ phosphate under variety in treatment (R1P1KS20) showed significantly ($P<0.05$) higher plant height (76.07 cm), number of branches (14.08 plant⁻¹), shoot dry biomass (52.01 g plant⁻¹), root dry biomass (7.60 g plant⁻¹), total dry biomass (146.4 g plant⁻¹), number of pods (84 plant⁻¹) and yield (2158 kg ha⁻¹) compared to variety N26 in treatment (R1P1N26). A combination of *Rhizobium* MEA 716 100 g ha⁻¹ and phosphate rock 30 Kg ha⁻¹ under variety KS20 led to improved growth attributes equally yield components of KS20 variety over N26. From these findings, application of *Rhizobium* MEA716 at 100 g ha⁻¹ and 30 Kg ha⁻¹ phosphate rock under variety KS20 is recommended for improved and a sustainable green gram production in the study area.

Keywords: Low Green-Gram Production; *Rhizobium* Inoculation; Phosphate Rock Application; Green Gram Yield Improvement

Nematode Soil Food Web in Different Land Use Systems in Embu

Karuri, H.,

University of Embu, Kenya

Correspondence : hwkaruri@gmail.com

Abstract

Agricultural intensification that results in conversion of forests into crop fields affects soil biodiversity including nematodes which contribute to ecosystem services and play a key role in maintenance of soil health. The nematode soil food web and metabolic footprints of a tropical forest and surrounding tea fields in Embu, Kenya were investigated. Soil samples were collected from tea fields and forest and the nematodes identified to the genus level. The plant-parasitic index in the tea fields was high and abundance of nematodes in cp2 class and Ba₂ functional guild were greater than those in the forest. *Helicotylenchus*, *Rotylenchus*, *Telotylenchus* and *Malenchus* occurred in higher densities in the forest which also had a significantly high predator footprint. The pH, Mn, sand, clay and silt content varied across the forest and tea fields. Nematode communities in the two land use systems were distinct based on non-metric multi-dimensional scaling ordinations. *Heterocephalobus* which was positively correlated to pH and *Helicotylenchus*, *Telotylenchus*, *Iotonchus* and *Rotylenchus* which had a negative association with silt contributed to the dissimilarity observed in the forest and tea fields. The findings provide an insight into the effects of land use change on nematode communities in the two systems and provides baseline data that can be used to make informed decisions on tea production and land use strategies that enhance soil health.

Keywords: Nematode Soil, Food Web, Land Use Systems, Embu

Antimicrobial Activity of Mushroom (*Agaricus Bisporus*) and Fungi (*Trametes Gibbosa*) Extracts from Mushrooms and Fungi of Egerton Main Campus, Njoro Kenya.

Waithaka, N¹, Gathuru, E. M.², Githaiga ,B.³, Onkoba K. M.⁴

¹Kirinyaga University, Kenya, ^{2,3,4}Egerton University, Kenya

Correspondence: [pjenga@kyu.ac.ke](mailto:pnjenga@kyu.ac.ke)

Abstract

The emergence of drug resistance pathogens has caught the attention of scientist due to the risk of going back to the pre-antimicrobial era. This study was carried out to investigate the antimicrobial properties of mushroom (*Agaricus bisporus*) and fungal (*Trametes gibbosa*) metabolites. The study involved isolating *Erwinia spp* and *Ralstonia solanacearum* from infected plants followed by subjecting the isolates and commercially acquired *Staphylococcus aureus* (ATCC 25923), *Enterococcus faecalis* (ATCC 29212), *Escherichia coli* (ATCC 25922), *Pseudomonas aeruginosa* (ATCC 27853), *Streptococcus pneumoniae* (ATCC 49617), *Proteus vulgaris* (ATCC 49990), *Candida albicans*, *Aspergillus niger* (ATCC 1015), *Fusarium oxysporum* (ATCC 16608), *Ustilago maydis* (ATCC 14826), *Microsporum gypseum* (ATCC 15621) and *Malassezia furfur* (ATCC 14423) to antagonism by mushroom and fungal isolates. The study revealed that mushroom and fungi metabolites inhibit growth of the tested pathogens. However, fungi metabolites did not inhibit growth of Gram positive bacteria. In addition, there was no significant difference in inhibition of the bacterial growth by mushroom extracts ($P=0.09$). However, there was significant growth inhibition of the bacteria by fungal extracts ($P=0.00001$). In addition, there was no significant difference in bacterial growth inhibition between mushroom and fungal extracts ($P=0.089$). On antagonism of pathogenic fungi, there was no significant difference in growth inhibition of the fungi by mushroom extracts ($P=0.24$). Contrastingly, there was significant difference in growth inhibition of the fungal pathogens by the fungal extracts ($P=0.025$) and also inhibition of the fungal pathogens by mushroom and fungal extracts ($P=0.0022$). Mushrooms and fungi produce antimicrobial metabolites that can be exploited in treating diseases that affect man, plants and animals. This study established that the extracted antifungal metabolites did not inhibit growth in gram positive bacteria. There is need to carry further study to establish the chemical composition of the antimicrobials.

Keywords: Antimicrobial Activity, Mushroom (*Agaricus Bisporus*), Fungi (*Trametes Gibbosa*) Extracts , Fungi , Egerton University , Kenya.

Real-time Monitoring of Water Quality in Lake Nakuru Using Telemetry

Kipkemboi, J. K.¹, Manene F. M.², Rotich, S. K.³, Nyamu J.K.⁴ Omengo, F.⁵

¹Kaimosi University College, ²Egerton University, ³Moi University, ⁴Kirinyaga University, ⁵Kenya Wildlife Service.

Correspondence: jrmuriuki@kyu.ac.ke

Abstract

Water quality monitoring in water bodies is necessary to determine the instantaneous and temporal variations of major pollutants and key water quality parameters. Such monitoring leads to informed decision making and timely interventions using appropriate mitigation measures. In this work, a low power, low range communication technology for wide area networks (LORAWAN) was applied with sensor nodes to collect real-time water quality data on Lake Nakuru waters. The network consisted of wireless sensors, a communication network and data visualization with cloud storage. The sensors were connected to the sensor node deployed on a floating buoy on the lake and was powered by a solar panel. The sensors captured environmental parameters such as temperature, electric conductivity, pH, and dissolved oxygen. The sensor node transmitted the data to a gateway over the long range at a very low-data-rate with low power consumption. Cloud server applications, Things network together with Things speak, were employed to receive, present and store measured data. The implementation of the wireless sensor technology has enabled long-term data collection at scales and resolutions that are difficult to obtain manually. In addition, the sensor's real-time connection with its immediate physical environment provides localized and updated measurements that are hard to obtain through traditional methods of data collection. Further, this wireless sensing system can be used in telemedicine applications.

Keywords: LoRAWAN, Water Quality Monitoring Environmental Monitoring, Wireless Sensor Network

Assessment of Tomato Farming Strategies, Diseases Knowledge and Management Practices Among Farmers' in Kirinyaga County, Kenya

Ogallo, F^{1*}, Onyango, B.², Muraya, M.³

^{1 3}Chuka University, Kenya, ²Jaramogi Oginga Odinga University of Science and Technology, Kenya

Correspondence: Ogolla.fredy@gmail.com

Abstract

Diseases are hindrance to tomato production in Kirinyaga County, Kenya. However, information on farmer's disease knowledge to warrant pesticide use, disease predisposing factor such as variety choice, seed source and irrigation system is scanty. This study assessed the association between tomato varieties grown, farming strategies, farmers' socio characteristic, disease knowledge, diseases management practices, legal status and sources of pesticides used in tomato farming and knowledge of biological control agents with the agro ecological zones in Kirinyaga County. A cross sectional survey method was used for the study. Data was collected from 120 tomato farmers using structured questionnaires. A chi square (χ^2) test was used to examine the association between different variables at $\alpha = 0.05$ using SAS version 9.4. There was no significance association between source of tomato planting material and agro ecological zones ($p > 0.05$). There was significant association between tomato varieties grown and the reasons for choice ($p > 0.05$). Irrigation system used in tomato farms was significantly associated with agro ecological zones ($p > 0.05$). Farmers' knowledge of causative agents of early blight, late blight and *Septoria* leaf spot was significantly associated with agro ecological zones ($p > 0.05$). Up to 55% of farmers gained knowledge of tomato diseases through farming experience. Observation of the chemical withdrawal period in tomatoes was not significantly associated with the level of pesticide dose applied ($p > 0.05$). More than 46% farmers used wrong pesticide doses and only 48.33% used legal pesticides all the times. The knowledge of use of biological control agents among farmers was not significantly associated with agro ecological zones ($p > 0.05$). Inability of some farmers to identify tomato diseases as well as application of improper pesticide doses are challenges in tomato production in Kirinyaga County. There is need to put in place coordinated education on crop disease, proper use of pesticides and surveillance to limit access to illegal pesticides.

Keywords: Tomato Production, Indigenous Knowledge, Perception, Pesticide-Use

Occurrence of Fungal Foliar Diseases of Tomato in Different Agro-Ecological Zones of Kirinyaga County, Kenya

Ogolla O. F.*¹, Muraya M. M.², Onyango O.B.³

^{1 2}Chuka University, Kenya, ³Jaramogi Oginga Odinga University of Science and Technology, Kenya

Correspondence: ogolla.fredy@gmail.com

Abstract

Tomato production is characterized by inconsistent quality and yields due to biotic constraints such as fungal foliar diseases. Information on the occurrence of the diseases in different agro-ecological zones of Kenya is scanty. This study assessed the occurrence of early blight, late blight and *Septoria* spot diseases in tomato farms in five agro-ecological zones (AEZ) of Kirinyaga County in Kenya (UM2, UM3, UM4, LM3 and LM4) using cross sectional survey method. Macro plots were systematically established diagonally in tomato farms and were used to assess disease incidence and severity. Incidences and severity data were subjected to analysis of variance (ANOVA) using Kruskal wallis *H* test at $\alpha = 0.05$. Median comparison was performed using Steel Dwass Critchlow Fligner with bonferroni adjustment in Statistical Analysis System (SAS) version 9.4. Incidences and severity of early blight, late blight and *Septoria* spot in tomato farms were significantly different among the villages and agro-ecological zones ($p > 0.05$). Incidence of early blight ranged from 35.7% to 76.65% with severity ranging from 17.15% to 50.87%. The incidence of *Septoria* spot ranged from 23.56% to 93.42% with severity ranging from 16.67% to 44.44%. The incidence of late blight ranged from 33.33% to 86.63% with severity ranging from 16.67% to 33.33%. The incidence of early blight was significantly higher in AEZ UM3 (Median= 75%), the incidence of *Septoria* spot was significantly higher in AEZ LM4 (Median = 83.33%) while the incidence of late blight was significantly higher in AEZ UM3 (Median= 50%). Severity of early blight was significantly higher in AEZ UM3 (Median = 38.89%), *Septoria* spot was significantly severe in AEZ LM4 (Median = 40.28%) while severity of late blight was significantly higher in AEZ UM4 (Median= 32.72%). It was concluded that the incidences and severity of the three foliar fungal diseases of tomato were different in different AEZ of Kirinyaga County. These findings serve as a baseline study and can be used to enlighten farmers on tomato fungal diseases in the area. However, there is a need for studies to evaluate predisposing factors and determine the economic impact of foliar fungal diseases of tomatoes in Kirinyaga County.

Keywords: Tomato, Early_blight, Late_blight, Septoria_spot, Kirinyaga, Kenya

Rural Water Supply in the Era of Climate Change in Kenya; The case of Kapseret Sub County, Uasin Gishu County.

Biwott, C., G.C., Kiplagat, A & Ngetich, J.K.

University of Eldoret, Kenya

Correspondence : gladysbiwott@gmail.com

Abstract

There is a perception that water supply in Uasin Gishu county is reliable due to the medium to high annual rainfall amounts received in the region. However, this is not the case as rainfall is not evenly distributed throughout the year. This study was carried out in Kapseret Sub County to assess reliability of domestic water sources by evaluating the safety of domestic water sources as well as establishing household domestic water consumption patterns. Data was collected from 404 households selected randomly in the rural part of Kapsaret Sub-County. The study established that domestic water sources include; shallow wells(92.2%), rainwater (14.4%), river (8.2%), stream (5.2%), borehole (2.0%), piped water (3.9%), dams (2.0%) and springs (1.05). 44.8% of the households experience seasonal water shortage, with 34.7% using water from unprotected water sources, and therefore prone to contamination. Domestic water uses include drinking, cooking, bathing, toilet flushing, cleaning house, cleaning utensils, irrigating lawns, washing bicycles, motorcycles and cars, watering animals. The highest demand for domestic water was for watering animals in the dry season (26.6%) and bathing in the rainy season (22%). The average household domestic water demand was 240.7 liters and 239.3 liters in the dry and rainy seasons respectively. Since significant number of households in rural areas face seasonal water shortages, with others lacking access to potable water sources, there is need to augment existing local water supplies through water reuse.

Keywords: *Domestic Water Supply, Augmentation, Climate Change*

Factors influencing Stormwater Utilization in Kapseret Sub-County, Uasin Gishu County, Kenya Addressing Challenges of

B, G.C, Kiplagat, A & Ngetich, J.K.

University of Eldoret, Kenya

Correspondence : gladysbiwott@gmail.com

Abstract

Stormwater is an underutilized resource in Kapseret Sub County in Uasin Gishu County. Although stormwater harvesting infrastructure is underdeveloped in Kapseret Sub County of Uasin Gishu County, households with access to stormwater seldom utilize it. This study was undertaken in rural areas of Kapseret Sub County, with the aim of assessing the level of access to stormwater utilization as well as to establishing factors that influence stormwater utilization. Four hundred and four (404) Respondents households were selected randomly to acquire provide data on their views on use of storm water. The study established that 28% of the respondents had access to stormwater with the bulk of it being in the rainy season, following a rainfall event, with only 2% having access to harvested stormwater in dams. The level of utilization of stormwater in the Sub-County was very low as only (11.4%) of the households utilize stormwater. The uses of stormwater include watering animals (9.9%), laundry (6.2%), bathing (4.5%), cleaning house (3.5%), drinking and cooking (1%), irrigation (0.5%) and washing cars/motorcycles (0.5%). Only 1% of respondents use stormwater for potable uses. Factors influencing stormwater utilization included; access to stormwater, land size, income, awareness that stormwater is a source of water for domestic use and frequency of water shortage/knowledge on stormwater management. Stormwater, if utilized, would enhance water security by reducing demand on potable water sources. There is therefore need to invest in stormwater harvesting, hence increase in order to expand access to the resource. It is also important to educate the population on end uses of stormwater and the role of stormwater in augmenting local water supplies.

Keywords: *Stormwater, Storm Water Harvesting, Utilization, Potable Uses, Domestic Use.*

Application of Integrated Water Resources Management Principles in Urban Kenya: The Case of Kapsabet Town

Chemutai, J, Daudi, F & Ngetich, J.K,

University of Eldoret, Kenya

Correspondence: *janochemu91@gmail.com*

Abstract

Water is life as societies need sufficient amount of it to drive their economic and social development. The environment needs water too for its ecological functions. Water issues, like shortages and supply deficits are every day challenges that call for an integrated approach to its management taking into account stakeholder participation, institutional integration and catchment protection. The broad objective of the study was to examine the application of Integrated Water Resource Management (IWRM) principles in Kapsabet town, involving establishment of IWRM practices , as well as determining factors that support IWRM and associated challenges. A sample of 384 Respondents, drawn from 12 Administrative Locations were randomly selected for interviews and counterchecked by Key Informant interviews. The study established that the components of IWRM practiced in Kapsabet Town involved stakeholder participation whereby public meetings on water management were done twice per year according to zones. The National Environmental Management Authority and WARMA institutions are involved in water conservation initiatives. A major factor that supports IWRM practice is the issue of water resource information management system facilitated by Kapsabet/Nandi Water Supply Company. The IWRM challenge cited was inadequate funding by the Nandi County to support water management activities. The study concludes that full implementation of IWRM in Kapsabet Town is yet to be achieved and the whole question of IWRM application has not been fully understood by 17% of the respondents and hence the need for continuous public awareness through trainings and seminars on the concept of IWRM.

Keywords: *Integrated Water Resource Management, Catchment Protection.*

SUB THEME: BUSINESS & ENTREPRENEURSHIP

Managerial Networking and Competitive Advantage: The Moderating Influence of Competitive Intensity

Mwendwa, A. M.¹, Atambo, W.², Bravo M.³, Akiya, R.⁴

^{1 2 3}Jomo Kenyatta University of Agriculture and Technology, Kenya, ⁴Department of Business, Kenya Institute of Government, Nairobi, Kenya

Correspondence: amwendwa@jkuat.ac.ke

Abstract

Because economic action is embedded in networks of inter-personal relations, many scholars have highlighted the importance of social ties in resource exchange for competitive advantage. Thus, through their networking activities and personal interactions, firm executives build social ties not only with business players but also with political entities. Conversely, at the centre of every industry's environment is the concept of competitive intensity defined by Barnett (1997) as the "effect that an organization has on other's survival, regardless of tactics involved". Taking into consideration that managerial networking is widely viewed as far more common, relevant and effective in emerging markets such as Kenya, and further noting that market turbulences in Kenya are generally attributed to competitive pressure brought about by trade liberalization, this study sought to establish the influence of managerial networking on competitive advantage in medium and large garment companies in Kenya and determine the moderating influence of competitive intensity on the managerial networking-competitive advantage relationship in the forestated companies. A cross-sectional survey design was adopted with a sample of 83 firms being drawn from a population of 170 firms. Data was collected through questionnaires and a response rate of 86.7% was attained. Descriptive analysis was used to establish the characteristics of the industry in relation to levels of managerial networking, competitive intensity and competitive advantage. Inferential analysis used to establish the relationships between the variables. The study had hypothesised that competitive intensity negatively moderates the managerial networking - competitive advantage relationship. Results showed that competitive intensity positively moderated the relationship. It is recommended that firms need to abandon redundant networks and retain strategic networks to address intense competitive pressure. Further, organizations need to focus on utilizing network resources more effectively for greater ability to adapt and thrive.

Keywords: Managerial Networking, Competitive Advantage, Competitive Intensity, Business Ties, Political Ties, Financial Ties

Tender Leaders Behind Bars- Smokescreens of the Self-Identity of Child Inmates in Borstal Institutions of Kenya

Mukoba , D. A.

Laikipia University, Kenya

Correspondence: asuledave@gmail.com

Abstract

Nurture provides leadership qualities in human beings. Nature moulds the leader presupposing significance of childhood yet children constitute a vulnerable population especially those in conflict with the law. In Kenya, such children aged 15-17 years are placed in correctional facilities known as borstal institutions. There are three such facilities in Kenya. Shikusa and Shimo LaTewa for boys and Kamae Girls Borstal Institution for girls. In this paper, these children will be referred to as child inmates making up the most vulnerable group of all inmates since they are in their developmental and formative years and have not yet grown into functioning adults. Their experiences provides them the opportunities to develop their potentials such as those of leadership. Notably, correctional facilities are not the best place for children to learn their mistakes and make changes in their behavior, thus there are indices, smokescreens, of leadership that can be teased from the everyday talk of child inmates. The main objective of this study was to identify and interrogate the different forms of expressing negative self-image by the child inmates that hide their leadership potential. The paper adopts an interdisciplinary approach with applied linguistics as the cornerstone. Four theories were used to conduct the desk review namely Discursive Psychology, Foucault's Constructionist Theory of Meaning and Representation, Discourse-Historical Approach, as well as Becker's Labelling Theory. The inmates indicated that they use discussions to construct their self-identity through the negative expressions in their daily talk.

Keywords: *Child Inmates, Indices/Smokescreens, Self-Identity, Tease Out, Vulnerable Populations*

Job Satisfaction of School Security Guards in Baringo County

Chemwei, B.¹, Koech, Sharon Jerotich²

¹Kirinyaga University, Kenya, ²Baringo County Assembly, Kenya

Correspondence: bchemwei@kyu.ac.ke

Abstract

Job satisfaction is a critical factor in work places in all professions globally. It affects work-related behaviours such as productivity, efficiency, absenteeism and turnover. Thus, organizations cannot reach competitive levels of quality if the employees do not feel satisfied. In Baringo County, there has been a notable concern over the low job satisfaction among security personnel in secondary schools. The purpose of this study was to find out the various levels of job satisfaction among secondary school security personnel in Baringo County. The study was guided by the theories of motivation and job satisfaction. The study used descriptive cross-sectional survey design and targeted a population of 508 security personnel and 169 principals in public secondary schools in Baringo County. A sample of 194 security personnel was used in the study. Random sampling technique was used to select 10% of the school principals to participate in the study. A questionnaire and interview guide were used to collect data. The questionnaire had a reliability index of 0.799. Quantitative data was collected and analysed using descriptive (means, percentages as well as frequencies) and inferential statistics. Results showed that a majority of school guards felt a strong sense of belonging to their school and were happy with their work because it offered them a feeling of accomplishment but their main outcry was on low salary and lack shelter for protection, especially during harsh weather. There is need to align the salaries of school guards with government recommendations, that both monetary and non-monetary rewards should be used to motivate security personnel in schools, schools should offer regular trainings for security personnel to enhance their skills and make them more productive and alert to emerging security threats in institutions of learning. Schools should avail adequate working tools such as gumboots, torches, rain coats, utensils and equipment and put up houses for security guards or offer commensurate house allowances to motivate these workers. In so doing, the schools will foster a healthy and safer working relations with security personnel.

Keywords: *Job Satisfaction, Job Satisfaction Levels, School Security Guards*

Influence of Access to Government Procurement Opportunities on Performance of Women-Owned Micro Enterprises in Kenya

Munyua, C.

Karatina University, Kenya

Correspondence : cmmunyua@gmail.com

Abstract

Women owned businesses account for about 48% of all micro, small, and medium-sized enterprises, contributing approximately 20% to Kenya's GDP. However, despite the trade prevalence given to women entrepreneurs in Kenya, women owned microenterprises lag behind their male counterparts. This study was informed by Oate's the theory of Fiscal Federalism and Gibb's Micro and Small Enterprise Support Theory.

This study sought to establish the influence of access to government procurement opportunities on performance of women owned micro enterprises in Kenya. H₀₁: Access to government Procurement opportunities has no significant influence on the performance of women-owned micro enterprises in Kenya

The study adopted a positivist paradigm and comprised 628 registered women owned micro-enterprises in Kiambu, Kirinyaga, and Makueni County governments, from which a Sample of 239 respondents was determined using the fisher formula. Response rate was 173. Stratified random sampling technique was used to determine reliability and validity of the research instrument. A pilot test was conducted on 10% of the sample size and data generated analyzed using descriptive statistics, trend analysis, diagnostic tests and inferential statistics. Primary and secondary data was used from registered women entrepreneurs and National Treasury respectively. There was a positive relationship between access to government procurement opportunities and performance of women-owned micro-enterprises in Kenya ($R= 0.289$ and $p=0.000$). The null hypotheses was thus rejected. Fiscal perspective better explained the relationship between access to government procurement opportunities and performance of women owned micro enterprises in Kenya.

Key Words: *County Governments, Decentralization, Procurement Opportunities, Performance.*

Human Resource Practices and Organizational Citizenship Behavior Development**Njoroge, D.¹, Sabwami, P.²**¹Kirinyaga University, Kenya, ²Garissa University, Kenya**Correspondence:** dnjoroge@kyu.ac.ke**Abstract**

Organizational citizenship behavior refers to the willingness of a worker to go an extra mile to support organizational goals. It has immense benefits in an organization and leads to increased productivity and competitive advantage. Human resource management practices have been thought to either enhance or hinder the development of organizational citizenship behavior. This study sought to determine the impact of human resource management practices namely recruitment, selection and training, and development on the development of organizational citizenship behavior at Delmonte Kenya Ltd. and Nampak Kenya Ltd. 243 respondents were sampled. The study adopted descriptive research design and data analysed using multiple regression. There was a significant positive correlation between recruitment, selection, training and development and organizational citizenship behavior (OCB). Recruitment and selection and training and development were found to account for up to 55.9% of the variation in OCB. There is need for managers to invest in recruitment, selection to ensure the best candidates are recruited and that training and development is done in order to increase probability of Organizational citizenship behavior..

Keywords: *Organizational Citizenship Behavior, Recruitment and Selection, Training and Development*

Balancing Natural Powers, Synthetic Powers for Societal Development: Female versus Male Powers interplay in a Man of the People, When the Sun Goes Down and Song of Malaya
Muhia, P. M.

Laikipia University, Kenya

Corrspondence: mwangiphilip03@gmail.com

Abstract

Understanding society's social order: power interplay between sets groups and what institutes these powers is critical knowledge for societal development. The interplay defines the relationship that exists between sets groups. Whether or not these powers are natural or synthetic is a philosophical question that can be addressed by observing the powers at play. The subversion of the synthetic powers have dominated studies creating need to talk about the natural powers. The paper presupposes that gender empowerment is inclined towards women, that the natural powers are invisible and likely to be overlooked unlike the male powers which are louse-ridden by visible institutions. Natural powers are overlooked but when at play, they overshadow the non-natural powers namely economic and patriarchal among other powers. Limited knowledge of the power interplay leads to misinterpretation of these powers and a problem in understanding the society and its structures. Literature through imaginative writing is weighted to explaining these phenomena and ensuring that people co-exist peacefully. The paper takes a comparatively approach to the study of ideological kinship between Chinua Achebe's "A Man of the People", Kamau Wa Goro's, "When the Sun Goes Down" and Okot P'Bitek poem, "Song of Malaya". The three prominent male authors have used the power of writing to protest against supremacy of the natural powers over the synthetic powers. The objective of the paper is to demonstrate the imaginative writing constitutes latent grounds for reflection on critical engagement, nature of existence and social structures. The paper employed the insights of deconstruction theory and text analysis method to light up the discussion in the three literary pieces which is important for intellectual understanding of any society. Henceforth, this study will refer to the natural powers as invisible powers.

Keywords: *Natural powers, Invisible Powers, Non-Natural Powers, Visible Powers, Power Interplay, Ideological Kinship*

Leadership and Sustainable Development in Africa: Lessons from Traditional Yoruba Society

Balogun, O. A.

Redeemers University, Ede Osun State, Nigeria

Correspondence: balogundele@yahooemail.com

Abstract

Africa has been experiencing high level of poverty, hunger, sicknesses, low literacy rates, gender inequalities and insecurity making her to be classified as underdeveloped. This paper presupposes that effective leadership is paramount to attainment of sustainable development goals in Africa. The paper argues further that to put an end to poverty, sicknesses and neglect of environments in the 21st Century Africa, it is highly essential to reengineer the concept of leadership that will foster development in Africa. Furthermore, it is argued that the fundamental principles of effective leadership as exemplified in traditional Yoruba society must be imbued and displayed by current African leaders. Moreover, the paper avers that some of the fundamental principles of leadership like commitment to societal goals, equitable distribution of wealth and management of resources, maintenance of environment, exhibition of good character as obtained in traditional society must be reintroduced and enforced in the leadership practices of Africa. In addition, the paper advocates the oath of performance and covenant of commitment which necessarily binds the leader to the society as demonstrated in traditional Yoruba society, must be taken by every leader in Africa. The methodology adopted is analytical and critical. It explores conceptual analysis in discussing the myriad problems facing Africa and how sustainable development goals can be used to combat these problems. Its critical character derives from the fact that it assesses the fundamental principles of effective leadership in traditional Yoruba societies to serve as a foundation in the quest for sustainable development in the 21st century Africa. It is recommended that lessons and inspiration from traditional Yoruba society are essential to revolutionizing leadership style in 21st century Africa to achieve sustainable development.

Keywords: *Leadership Sustainable development, Africa, Traditional Yoruba*

Servant Leadership and Organization Performance of Faith-Based Self Help Groups in Anglican Church of Kenya in Kirinyaga County, Kenya

Mugure, Racheal¹, Githira, Charles²

¹Thika Technical Institute Thika, Kenya ²KCA University, Kenya

Correspondence: r1mugure07@yahoo.com

Abstract

Organization performance has attracted attention in profit and non-profit organizations. In the current sporadic, complicated and dynamic business environment the need for swift and accurate decision making cannot be ignored. To achieve this organization have adopted servant leadership approaches. Despite its attractiveness, its contribution in faith based organization is inconclusive. This study examined the effect of servant leadership on organization performance. Specifically, the study examined the effect of empowerment, stewardship, role modeling and compelling vision on the effect of organization performance in faith based self help groups in Anglican Church of Kenya in Kirinyaga County in Kenya. The study was anchored on Green leaf leadership and situational leadership theory. Primary data was sourced using questionnaires among 80 respondents. Data was analysed using descriptive and inferential statistics. It was documented that servant leadership has positive and significant effect on organizational performance of faith based self help groups in Anglican Church of Kenya in Kirinyaga County. There is need for adoption of servant leadership to achieve effective organizational performance.

Keywords: Financial Structure, Equity, Debt, Financial Performance, Non-Financial Firm.

Influence of Needs Identification on Implementation of Cash Transfer Programmes in Kapsoya Ward, Uasin Gishu County, Kenya

Murei, R., Kiprop, V., Danol, R.

Eldoret National Polytechnic, Kenya

Correspondence: mureir@gmail.com,

Abstract

Project management practitioner's globally advocates the needs assessment for successful implementation of projects. This study sought to establish the influence of needs assessment on implementation of cash transfer programmes in Kapsoya Ward, Uasin Gishu County, Kenya. The research was guided by Community Action Planning (CAP) model for sustainable community participation. The study employed a descriptive survey research design with a target population of 553 staff from the Ministry of labour and social services and beneficiaries of the cash transfer programmes at Kapsoya ward county level. 232 staff were sampled from two different strata using stratified and simple random sampling procedure. Primary data was collected using structured questionnaire and interviews, and descriptive statistics and thematic analysis used to analyse the data. Findings was used in policy, theoretical and operative frameworks. Results showed that beneficiaries are not involved or aware of the needs assessment process. There is need for policy makers in the respective positions to embrace needs assessment ahead of project implementation.

Keywords: *Needs Assessment, Projects, Cash Transfer, Implementation.*

Factors That Promote Engagement in Entrepreneurship Among the Youth to Reduce Unemployment in Kenya

Kisirkoi, S.

Maasai Mara University, Kenya

Correspondence: kflorence@mmarau.ac.ke

Abstract

Youth unemployment has become of major concern to many countries globally. This study sought to determine the factors that promote entrepreneurship among the youth to reduce unemployment in Kenya. The acute unemployment rate of the Kenyan youth is a potential source of insecurity, political and economic instability. According to a 2019 population census report by the Kenya Bureau of Statistics, the youth comprised 70% of the total population in the Kenya making up the largest pool of human capital that needs to be tapped economically. Every effort must therefore be made to ensure the youth are usefully engaged. Purposive research methodology was used focused on the youth in Kasarani Sub-county of Nairobi and Narok town. The sample size was 100 businesses, comprising 65 from Nairobi and 35 from Narok drawn from *boda boda*, cybercafés and groceries operators. Data was collected using interview schedules, observations, and secondary sources. In the opinion of the researcher, the two towns- in Nairobi city and Narok town, typically represent the actual situation across the country. Data was analyzed and presented using descriptive statistics. The youth should be encouraged to acquire relevant knowledge and technical skills and granted capital to enable them engage in credible business. Creativity, flexibility, innovativeness and alignment of business plans with one's personal goals are critical to success in entrepreneurship.

Keywords: Engagement, Entrepreneurship, Youth, Unemployment

Credit Risk Management and Loan Performance of Non Deposit Taking Microfinance Institutions in Kenya: A Case Study of Kirinyaga County

Maina, J., Muigai, R. G.

Kirinyaga University, Kenya

Correspondence: jrunyora@gmail.com

Abstract

Credit risk management is a key ingredient in management of loan portfolios among financial institutions because it minimizes losses and guarantees acceptable level of returns for the shareholders. Since microfinance institutions provide loans to the poor who may not access loan from banks, credit risk management practices is fundamental to loan performance among microfinance institutions in Kenya. This study assessed the influence of credit risk management strategy on financial performance of the non-deposit taking microfinance institutions in Kenya. The study was guided by Information Symmetry, Adverse selection and the Moral Hazard Theories. Descriptive survey research design was adopted for the study whose target population comprised branch managers of all the registered microfinance institutions in Kirinyaga County of Kenya. Data was collected using structured questionnaires administered through drop and pick method and analyzed the data using Statistical Package for Social Sciences. Descriptive statistical namely means, median, mode and standard deviation while inferential statistics was performed by estimating the specified regression model using t-test and F-test statistics. Results were presented using tables, pie charts, cross tabulations, correlations and figures. All the parameters of Credit risk management were positive and statistically significant on loan performance among non-deposit taking microfinance institutions. Management of microfinance institutions should strengthen their credit risk management strategies in order to maintain healthy loan performance and boost organizational financial performance.

Keywords: *Credit Risk Management, Loan Performance, Non Deposit Taking, Microfinance Institutions, Kenya, Kirinyaga County.*

Financial Uncertainty Indicators and Financial Performance of Manufacturing Firms in Kenya

Pila J.¹, Muturi W.², Olweny T.³

^{1 2 3}*Jomo Kenyatta University of Agriculture and Technology, Kenya*

Correspondence: jatuo2016@gmail.com

Abstract

This study sought to determine the influence that financial uncertainty indicators have on financial performance of manufacturing firms in Kenya focused on trade credit, firm liquidity, firm size and leverage and operational cost uncertainties on performance of manufacturing firms in Kenya. These firms have been facing various challenges both financial and non-financial leading to stagnated contribution of only 10% to National GDP due to declining profit and sales. Many factors have contributed to declining performance of manufacturing sector in Kenya. The study was anchored a number of variables namely credit risk theory, liability management theory, modern portfolio theory and agency theory. The study adopted positivism Philosophy and correlation design with a target population of 856 manufacturing firms registered with Kenya Association of Manufacturers. A sample of 90 firms was selected using Stratified random sampling technique and random sampling from 14 sectors. The study covered a period of 12 years starting from 2009 to 2020 both years inclusive. Panel data was collected from audited financial statements and published annual reports. Pre and post diagnostic tests were carried out on collected data to test assumption of linear regression using E-view 11.8 and further subjected to Normality, Hausman, Unit root, Heteroskedastic, Wald, Breusch and multilinearity tests. Both fixed and Random effect models were adapted depending on P value of variables using Hausman test. Results showed that financial uncertainty indicators had positive and significant impact on financial performance and that the size of manufacturing firms moderated the impact of financial uncertainty indicators on financial performance of manufacturing firms in Kenya.

Keywords: *Trade credit uncertainty, firm liquidity uncertainty, Firm leverage uncertainty, operational cost uncertainty, Financial Performance.*

Assessing the Influence of Talent Management Strategy on Job Satisfaction in the Lake Region Economic Bloc County Governments: A Case of Nyamira County, Kenya.

Omosa, J., Mwangi, G., Mwangi, C. & Muriithi, R.

Murang'a University of Technology, Kenya.

Correspondence: [*joashomosa10@gmail.com*](mailto:joashomosa10@gmail.com)

Abstract

Human capital inventory is an expensive asset that requires a critical strategy to maintain as it can easily move out of the organization or be underutilized thereby affecting organizational performance. Studies on job satisfaction have indicated that satisfied employees are loyal to organizations and expend more efforts towards attainment of organizational objectives. Nevertheless, it remains an issue in the minds of management scholars on what strategy can aid in improving job satisfaction among employees. Talent management is a core strategy, which aids in improving capability of employees in doing assigned tasks; however, there is limited research on how it influences job satisfaction in county governments creating need for the study. The study will be anchored on the affective events theory, which stresses that events at place of work influence employee emotions and reflect job satisfaction. This paper aims to assess the influence of talent management strategy on job satisfaction in the lake region economic bloc county governments in Kenya using Nyamira County as a case study. The study will employ a descriptive research design. The target population for the study will be all employees engaged by the Nyamira county government. Based on the uniformity purpose, samples for the study will be 90 employees drawn proportionately from the nine departments in the county government. Primary data will be collected with the help of a well-structured questionnaires administered using google forms. Data analysis will be done by Factor Analysis to determine the fitness of the proposed model. Pearson Correlation coefficient will be used to determine the relationship between variables and regression analysis to test the hypothesis. Results will be presented using appropriate figures, tables and graphs.

Keywords: *Talent Management, Talent Management strategies, Job Satisfaction, Nyamira County*

Adjustment of Interest Rates, Demand for Credit and Economic Growth in Kenya**Murithi, K., Waweru, G.***Kirinyaga University, Kenya***Correspondence :** kennethmurithi09@gmail.com**Abstract**

The main objective of this study was to determine the effect of changes in interest rate on demand for credit and economic growth in Kenya. In order to achieve these objectives, two empirical models were used, the first being the growth equation, with interest rate, private sector credit (as a percentage of GDP) and the other, the macroeconomic variables as the explanatory variables. Time series annual data ranging from 1970-2020 was used in the study. Results showed that investments have a positive and significant impact on economic growth while interest rates on the other hand had a negative and significant impact on demand for credit.

Keywords: *Interest Rates, Credit, Investment and Economic Growth.*

Client Appraisal and Loan Repayment Performance of Revolving Funds in Kenya**Kinyua, W. J., Kiiru G., Njoroge, D.***Kirinyaga University, Kenya***Correspondence:** joycekinyua13@gmail.com**Abstract**

This study sought to investigate the influence of client appraisal strategies on repayment performance of the revolving funds in Kenya. Specifically, the study evaluated the relationship between business assessment visits, financial skills training, types of training offered, duration of time before loan disbursement and repayment performance. The study adopted a descriptive correlational research design. A Stratified random sampling and purposive sampling techniques was used to obtain a sample of 181 youth and Woman Enterprise Fund officers in Kenya, while questionnaires were used to collect primary and secondary data. Multiple linear regression was used to test the research hypothesis and demonstrate the relationship between the variables. Results showed that the type of training had a positive and significant effect on loan repayment rate whereas business assessment visit, the number of trainings and the duration before loan disbursement had a positive but insignificant effect on loan repayment rates. This study contributes to the body of knowledge by establishing strategies that influence rate of repayment performance of revolving funds.

Keywords: *Client Appraisal Strategies, Rate of Repayment, Strategies, Default Rate, Revolving Fund.*

Innovation Orientation and the Performance of Insurance Companies in Kenya**Njuguna, W., Kabata, D., Wambugu, H.***Kirinyaga University, Kenya***Correspondence:** shirowillie@gmail.com**Abstract**

This study sought to evaluate the correlation between innovation orientation and performance in insurance companies in Kenya. Specifically, the study examined the effect of product innovation, process innovation, and market innovation on the performance in terms of gross premium and market share in the Kenyan insurance industry. The study adopted a framework to examine the relationship between the three types of innovations using descriptive and causal research designs. The target population was 406 heads of departments in 53 registered insurance companies and 5 reinsurance companies. A sample of 197 respondents was selected for the study, and data collected using semi-structured questionnaire and analyzed using multiple regression. Results showed that product innovation, process innovation and market innovation have a positive and significant effect on both the gross premium and market share of insurance firms in Kenya. There is need to allocate more resources to support innovation in a bid to penetrate new markets and improve performance. Product innovation should be geared towards introduction of insurance policies that are aligned to agriculture in the rural areas being the prevalent economic activity and other major contributors to Kenya's GDP.

Keywords: *Product Innovation, Process Innovation, Market Innovation, Gross Premium, Market Share*

Does Firm Size Have a Moderating Effect on the Influence of Financial Structure on Financial Performance of Listed Non-Financial Firms in Nairobi Securities Exchanges

Mweu ,T.¹, Kipkirui ,D. K.² Nyakina , Kwamboka A.³ Githira, C.⁴

^{1 2 4} *KCA University, Kenya, ³Kirinyaga University, Kenya*

Correspondence: mweuteddy@gmail.com

Abstract

Financing decision in most firms is a tradeoff between debt and equity financing though the most optimal combination is inconclusive. Further, the causality of debt and equity financing on financial performance has attracted a plethora of studies whose findings are mixed. It is on this background that the current study examined the influence of debt and equity financing on financial performance of listed firms in Nairobi Securities Exchange. The study further examined the moderating effect of firm size on financial structure and performance using the Modigliani and Miller hypothesis, trade off theory and agency theory. Panel data was collected from 2011 and 2020 and analyzed using Multiple regression modeling. Prior to modelling diagnostic tests were carried out. Results showed significant structure on financial performance. There was a positive moderating effect of firm size on the influence of financial structure on financial performance of listed non-financial companies in Kenya. There is need for firms to adopt measures that would optimize shareholders wealth as a response to their financial needs.

Keywords: *Financial structure, Equity, Debt, Financial Performance, Non-Financial Firm.*

Coaching Influences Service Delivery as a Key Management Development Practice in Public Universities in Kenya

Onsongo, E., N.

Kisii University, Kenya

Correspondence: ericknonsongo@kisiuniversity.ac.ke

Abstract

This paper adapts the definition of Coaching as a one-to-one process of assisting employees to grow their career and improve their performance through provision of constant feedback, encouragement and raising awareness by scrutinizing the present and predicting the future. This study presupposes that coaching is a developmental practice that employers should embrace to enable and empower people and open new opportunities for learning to attain improved performance. This study focused on coaching and how it influences service delivery in public Universities in Kenya. In the quest for organization to perform or deliver their services, there is need they need to inculcate coaching as a tool to ensure sustained competitive advantage. Results have shown how universities have embraced coaching as a management strategy to enhance individual performance by analyzing the present and setting performance targets and spelling out how to achieve them in a public University in Kenya.

Keywords: *Coaching, Human Resource, Service Delivery, Competence, Expertise*

Discursive Construction of Masculinities in Gender Based Violence (GbV) in Relation to Socio-Economic Status of Women in Kenya

Gitu, P. M.

Laikipia University, Kenya

Correspondence: gitupamela@yahoo.com

Abstract

For centuries, women have dealt with several forms of oppression. One of them being Gender Based Violence. Most women all over the world, Kenya included, are oppressed, discriminated, and looked down upon. This paper will critically analyse the cultural, patriarchal, gender roles and identities of GBV in relation to socio-economic status of women in Kenya. The paper will explore the effects of GBV on the social-economic status of women in Kenya. The study will be informed by the Feminist Security Theory and the theory will assist in clarifying what security means to the global woman. It focuses on security during peace and in war. It also looks into national and domestic security, which will be our focus in the paper. A qualitative research design will be adopted to gather data. A sample size of fifteen women who have undergone gender-based violence will be interviewed using semi-structured interview guides. A purposive and snowballing sampling will be used to sample the data hence considering ethical issues such as confidentiality, consent, and privacy. The data will be audio-recorded and analyzed thematically by identifying themes that will emerge from respondents' responses. Researchers on gender issues will be the beneficiaries of the study since it will inspire research in the area of gender and language by showing how language planners can inculcate issues of GBV into the curriculum. The study will also benefit the church and social support groups since they will look for ways to integrate victims of GBV into their circles

Keywords: *Gender Based Violence (GBV), Masculinity, Hegemony*

Sustainable Performance Framework Indicators for Domestic Tourism in Kenya case of Nakuru, Nairobi and Mombasa Towns

Omare, M.¹, Kambaga,D.²

¹Kisii University, Kenya, ²Technical University of Kenya, Kenya

Correspondence: okambaga@gmail.com

Abstract

This study looked at the factors that affect domestic tourism in Nairobi, Mombasa, and Nakuru with a view to addressing them and coming up with sustainable performance frameworks for domestic tourism industry. The study investigated a sample of cross-section of the tourist and other tourism stakeholders. A sample of 600 respondents from the tourism industry players in the regions was selected using purposive and stratified random sampling. A closed and open-ended structured questionnaire schedule with both closed and open-ended questions were used to collect data. A total of 558(93%) respondents filled and returned the data collection tools, analysis was done and statistical inferences made and conclusions drawn. Results highlighted the need for the government and other tourist industry stakeholders to work together in addressing hindrances to improve domestic tourism. There is need to make price adjustments, emphasize tourism education in school curriculae, create a strong people friendly domestic tourism policy, sensitize the local communities on the value of tourism and the need to conserve national resources for posterity.

Keywords: Domestic Tourism, Stakeholders, Taxation, People-Friendly

Reward Management Practices and Employee Performance in Commercial Banks in Kenya.

Karuri, E.

Kenyatta University, Kenya

*Correspondence : editahkaruri0@gmail.com

Abstract

The contribution of Human resources to the overall organizational well-being cannot be overlooked as these resources have time and again been regarded as important assets to the organization. The most perpetual challenge in most organizations today is lack of a well-structured reward management practices and employee performance program. This has heightened the need for reward management system in order to achieve employee performance in Commercial Banks in Kenya. Organizations develop their managers with the hope that they will transfer the attained knowledge towards employee performance. The main objective of this study was to establish the reward management practices that influence employees' performance in Kenyan Commercial banks. It is based on a comprehensive review of literature on the link between reward management practices and employees' performance. Social exchange, Maslow hierarchy of needs, expectation and Equity theories were reviewed in demonstrating the contribution of rewards systems to the overall employees' performance. Most of the studies reviewed used descriptive research design and descriptive and inferential statistics in analysing the collected mainly through use of questionnaires and interviews. Gaps in reward management has prompted organizations to seek managers from outside the organization which enhances competition for highly developed managers. However, some questions as to whether there are benefits accrued benefits to investing in reward management practices still linger and some studies viewed the programs as a waste of resources. This study will provide baseline data that can be used to guide decisions on the need of reward management practices to improve employee performance in commercial banks in Kenya.

Keywords: *Reward Management Practices, Employee Performance, Commercial Banks, Kenya.*

**Effect of Employee Resourcing on
Employee's Commitment in the Tele-Communication Industry in Kenya**
Maina, E.

Kirinyaga University, Kenya

Correspondence: evemaina@kyu.ac.ke

Abstract

Today's fast-paced, global business environment, coupled with the ever-growing challenge of a rapidly changing workforce, requires a well-planned, rigorous approach to employee's commitment. This study sought to investigate the effect of employee resourcing on employee's commitment in the Tele-communications industry. The study adopted a mixed research design and targeted all the telecommunication branches in Mount Kenya region that are managed by the shop manager being the top most managers in the branch. Primary data was collected using structured questionnaires and analyzed using inferential statistics and processed using SPSS Version 22 and multiple regression analysis used to establish the relations between the independent and dependent variables. Chi-square was used to test the hypothesis and was based on the alpha level or the significance level and results presented in the form of tables, graphs, and charts. Results showed that employee resourcing had a positive and significant effect on employees' commitment. It is recommended that organizations should focus on employee resourcing as a major strategic human resource management practice to ensure organizations get quality human capital that contribute effectively to employee commitment.

Keywords: *Employee Resourcing, Employee Commitment, Human Capital, Human Resource Management*

Employee Welfare CSR Strategy and Performance of Public Universities in Kenya

Kinyanjui, J

Kirinyaga University, Kenya

Correspondence: nkinyanjui@kyu.ac.ke

Abstract

The emerging developments on technological innovations and market liberalizations, demographic shifts, regulations and deregulations have forced many institutions to rethink their strategic imperatives as ways of enhancing their performances. The proliferation of public and private universities resulting in stiff competition and inadequate funding of public universities has been affected more so on service delivery. Therefore, universities strive to adopt strategies that contribute to performance, with one such strategy being corporate social responsibility. This study aimed to determine the employee welfare CSR strategy and performance of Public Universities in Kenya. In particular, the study focused on assessing the impact of employee welfare and performance of public universities. The CSR strategy is anchored on Functional theory of labour welfare. This study employed positivism philosophy to enable the generalization of the results. A mixed research design comprising quantitative and qualitative research designs was adopted. The population consisted of 31 public universities in Kenya and 18141 employees in administration of the public universities were explicitly targeted. Yamane's (1967) formula was utilised to determine a sample size of 391 respondents, whereby simple random sampling technique was used to come up with the sample. Semi-structured questionnaires of 5-point Likert scale were used to obtain primary data for analysis. A pilot study was done on 5% of the sample whereby Cronbach's alpha helped in testing reliability. Both construct and content validity of research instrument were checked. The qualitative analysis involved content analysis, while descriptive statistics of frequencies, means and standard deviation and inferential technique were utilised to analyse quantitative data using SPSS version 25. Significance level of inferential results was set at 0.05. Charts, figures and tables were used for presentation of results. The study's findings indicated that employee welfare CSR strategy, positively influenced performance of public universities in Kenya. The study concluded that CSR strategies positively and significantly influence the performance of public universities in Kenya. The study recommends that public universities in Kenya should enhance employee welfare CSR strategy because employees are the most valuable stakeholders in an institution, hence results to improvement in performance of public universities in Kenya.

Keywords: *Employee Welfare, CSR Strategy, Performance, Public Universities, Kenya*

Influence of Leadership on the Performance of Faith-Based Hospitals in Kenya.

Ndungu, W. G., Kiiru, G., Muchangi, D.

Kirinyaga University ,Kenya

Correspondence: wacorothau@yahoo.com

Abstract

Faith based hospitals in Kenya (FBH) play an important role in healthcare provision and contribute up to about 40% of all private healthcare needs. In Kenya, they operate in the private sector sponsored by various religious institutions, and their leadership structures, policies, and regulations of the sponsor. This study sought to establish the influence of leadership on the performance of faith-based hospitals in Kenya. The research utilized descriptive and correlational research designs, and the target population was 85 faith-based hospitals in Kenya. Since the target population was limited, all the 85 FBHs and 425 respondents were involved in the study. The research utilized both primary and secondary data. Primary data was obtained using questionnaires, while secondary data was collected from hospitals websites, online books, journals, and articles, hospital magazines and hospital records. Results showed that leadership has a weak positive correlation with performance ($r=.068$), meaning that leadership affects the performance of FBHs in Kenya. The research recommends FBHs to eliminate bureaucracies, enhance leaders' qualifications, and re-structure their leadership to improve performance.

Keywords: *Faith Based Hospitals, Leadership, Performance*

Influence of Market Structure on the Performance of Faith-Based Hospitals in Kenya.

Ndungu, W. G.¹, Kiiru, G.², Muchangi, D.³

Kirinyaga University, Kerugoya, Kenya

Correspondence: wacorothau@yahoo.com

Abstract

Faith based hospitals (FBHs) operate in a competitive market with many establishments providing identical services. The key constructs of market structure are competition, regulations, players, and market share. This study sought to establish the influence of market structure on the performance of FBHs. A descriptive and correlational research design was used and target population comprised 85 faith-based hospitals in Kenya. All the 85 FBHs and 425 respondents were included in the study. Primary data was obtained using questionnaires, and secondary data from hospital websites, online books, journals, and articles, hospital magazines and hospital records. Results showed that market structure (market competition, regulations, and players) ($r=-.062$) does not affect performance of FBHs in Kenya. There is need for FBHs to strengthen leadership structures to improve performance.

Keywords: *Faith Based Hospitals, Performance, Market Structure*

**Social Influence and Perceived Enjoyment: Predicting the Use of Mobile Payment Services
Kenya
Kabata, D.**

Kirinyaga University, Kenya

Correspondence: davidkabata@gmail.com

Abstract

The purpose of this study was to investigate the influence of social and hedonic factors on the use of mobile payment services in Kenya. A conceptual framework of social factors that influence use of mobile money transfer applications was developed. A descriptive survey design and systematic random technique was adopted as research design and data sampling methods while a questionnaire was used as data collection instrument. A research model was tested empirically using data collected from 680 mobile payment users situated in four towns located in Kenya. Structural equation model was used to test the research hypothesis. Results showed that social norm, education level, age and income levels influenced the use of mobile payment services in Kenya and suggested that social image and culture did not influence the use of mobile payment services. Whereas the majority of the studies have focused on the drivers influencing the adoption of mobile payment services in Kenya, this study goes further to focus on the usage and in this case test the social and hedonic factors that have been ignored by previous studies. The study contributes to the body of knowledge by establishing the social influence that plays a critical role in user engagement with mobile payment services in Kenya.

Keywords: *Mobile Payment, Social Factors, Hedonic Factors, Consumers.*

Measuring Human Resource Development Function for Sustainable Development

Kiruja, E.

Technical University of Kenya, Kenya

Correspondence: eskanyua@gmail.com

Abstract

Sustainable development is generally defined as “meeting the needs of the present generation without compromising the ability of future generations to meet their own needs.” It is unarguably one of the most important pillars on which a business has to be built. Human resource management is charged with the responsibility of organizing people to effectively perform organizational activities, the results are not automatic and requires a considerable planning process, monitoring and evaluation. The study focuses on the importance of human resource to Sustainable development and to describe various ways of measuring Human resource development in the framework of cost, time, quality, productivity. The data obtained will assist Human resource to re-assert its role in driving the competitiveness required by business today.

Keywords: *Human Resource Management, Sustainable Development, Human Resource Development*

Credit Referencing and Loan Repayment in Kenya

Muigai, R., G., Wamwuya, E.

Kirinyaga University, Kenya

Correspondence: rmuigai@kyu.ac.ke

Abstract

Credit referencing refers to a financial system regulated by the government (Central Banks) that involves gathering and maintaining data on credit history of individuals, businesses and other organizations and makes this information available to relevant users. This is undertaken by the Credit Reference Bureaus (CRBs), whom under reciprocity agreement with the lenders and other entities obtains, consolidates and package this information into individual reports and distributes it to lenders at a fee. Despite the decade-long existence of CRBs in Kenya, lenders continue to grapple with the NPLs menace although it has been reported elsewhere that credit referencing has led to reduction in NPLs. This is however empirically disapproved by the consistent rise in NPLs within the banking sector to date. This contrast has motivated a follow-up study to establish the accurate position. The study sought to investigate how credit referencing influences the Non-performing loans stock levels among the Kenyan lenders and was anchored on information asymmetry, the adverse selection theory and the Moral Hazard theory. The study adopted descriptive survey research design and targeted the 39 operational commercial banks and 14 MFBs in Kenya as at 31st Dec 2020. The study selected 21 commercial banks using stratified sampling plan based on the 3 existing tiers as defined by the Central Bank of Kenya and also included four MFBs. Respondents comprised Branch managers or Credit Officers. The study used questionnaires to collect primary data on the independent variable and a data collection sheet to collect Secondary data on the dependent variable. Results showed that credit referencing parameters were negatively but insignificantly related with NPLs levels. Consequently, it is recommended that the management of the Banks should not downplay adverse credit information relating to borrowers. The banks need to operationalize differentiated credit pricing models to reward borrowers with good credit history while the Central Bank should institute appropriate sanctions and strengthen supervision (M&E) on NPLs trends among the lenders. In addition, the CRBs should carry out more campaigns to sensitize the borrowing public on the key benefits of credit information sharing.

Keywords: *Credit Referencing, Loan Repayment, Kenya*

Influence of Pricing as Market Segmentation Strategy on Performance of Fashion Merchandising Shops in Kenya

Orangi, A. K., Chomba, G.

Kirinyaga University, Kenya

Correspondence: aorangi@kyu.ac.ke

Abstract

Fashion merchandising shops only, through the market segmentation; select the most favorable market in order to achieve economic profits. To be successful in fashion industry, the Fashion merchandisers need to segment their fashion merchandise strategy on performance, have knowledge of fashion supply chain and the ability to identify consumer behavior and anticipate their needs in all seasons. This study will determine the influence of pricing as a market segmentation strategy on performance of fashion merchandising shops in Kenya. The study will adopt consumer demand theory using a descriptive survey design to obtain in-depth information from respondents. The unit of analysis will comprise 579 fashion merchandising shops licensed by the respective county government authorities in Kenya. Each shop will provide one respondent, either the owner or the shop manager. A sample size of 237 respondents will be selected using the Slovin's formula described by Huckin 2013. Respondents will be selected using simple random sampling techniques. The study will use both structured and non-structured questionnaires to collect primary data from owners or managers of fashion merchandising shops. Data to be collected in this study will be both qualitative and quantitative in nature and multiple regression analysis will be employed to generate the regression models.

Keywords: Pricing, Market Segmentation Strategy, Performance, Fashion Merchandising Shops, Kenya

Nexus between Automation, Firm size and Performance of Initial Public Offering stocks at the Nairobi Securities Exchange in Kenya

Okumu, A. B. Olweny, T.²,Muturi, W.

Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya

Correspondence: bokumu@mmarau.ac.ke

Abstract

An initial public offering is a hallmark event in the life cycle of any company since it marks the transitioning from a private into a public entity. It enables companies to raise capital. However, despite this pivotal role, global trends are witnessing a reduction in the uptake of IPOs. In Kenya, there is preference to bond market compared to equity market. These challenges are exacerbated by the IPOs anomalies of positive initial returns and long term underperformance. A plethora of previous attempts failed to involve moderating variable of automation. This study sought to analyze the role of firm size on Performance of IPO stocks at the Nairobi Securities Exchange. The benchmarks of IPO performance were the NSE 20 share index and Capital Asset Pricing Model. Firm size was measured by market capitalization while Cumulative Abnormal Returns (CAR) and Buy and Hold Abnormal Returns (BHAR) were used as proxies for IPO firm performance. The NSE was automated in 2006. Automation was measured by separating firm size and performance of IPO between pre and post automation periods. The sample size was 15 firms which floated shares from 1994 to 2019. A total of 2,586 observations were made. The study used secondary data obtained from firms' annual reports, the Capital Markets Authority, NSE and other websites. Longitudinal and descriptive study designs were used together with multiple linear regression to analyze the data with Stata statistical software. Diagnostic tests confirmed that the data complied with Ordinary Least Squares requirements. The Hausman test was used to determine fixed and random effect model. It was established that automation had positive correlation with firm size. Under both methods, firm size positively influenced IPO stock performance. This study will assist the Kenyan government in developing financial stability measures and investors in making informed investment decisions.

Keywords: Automation, Firm size, Initial Public Offerings, Nairobi Securities Exchange.

Politeness Strategies Used by Kenya's Members of National Assembly

Ireri, H. K., Njuki, E.

Chuka University, Kenya

Correspondence: irerih@yahoo.com

Abstract

Linguistic politeness enhances proper interaction among members of society. During social interactions, interlocutors try to protect their positive public self-image and want to be seen as valuable members of society. Politeness ensures effective interaction among the members as they interact with each other in parliament. This study focused on the speeches of selected Members of Parliament in parliament context in order to find politeness strategies that they use. This study used purposive sampling technique where only the utterances with politeness strategies were selected for inclusion in the study. Data was downloaded from the Hansard and analyzed using content analysis method and politeness theory used to analyze, interpret and discuss the data. Descriptive qualitative research technique was used in analysing data and a guiding card was used to identify politeness strategies. Results showed that members of National Assembly use politeness strategies to minimize threats of physical confrontation within and outside the assembly. The findings of this study adds to the existing literature in the field of sociolinguistics and pragmatics and will help interlocutors understand strategies that they can use in order to communicate effectively so that both parties feel appreciated in a conversation.

Keywords: Politeness, Strategies, Speeches, Parliament.

Custom Duty Incentives and Financial Performance of Manufacturing Firms in Kenya

Mwangi, G., Gitau, R.

Kirinyaga University, Kenya

Correspondence : gideonmmwangi98@gmail.com

Abstract

The purpose of the study was to determine the relationship between customs duty incentives and financial performance of manufacturing firms in Kenya. The study also determined the moderating effect of tax administration procedures on the relationship between customs duty incentives and financial performance of manufacturing firms in Kenya. The study was anchored on tax discrimination theory. Descriptive survey research design was adopted where a sample of 211 firms was selected using the Yamane formula, from a target population of 447 manufacturing firms using stratified random sampling technique. Primary data was collected using questionnaires while secondary data was collected over a period of 10 years covering 2009 to 2018. The targeted respondents were the accountants, auditors and finance officers in the organizations. The response rate was 73.5%. Both descriptive and inferential data analysis was carried out. Diagnostic tests such as multi-collinearity, heteroscedasticity and test of normality was carried out. The data violated the assumption of normality, hence the study opted for ordinal regression analysis which is a non-parametric method of analysis. Results showed that customs duty incentives had statistically significant influence on financial performance of manufacturing firms in Kenya and that tax administration procedures which was the moderating variable had antagonistic effect on the relationship between custom duty incentives and financial performance of manufacturing companies. Because customs duty incentives led to improvement in financial performance of manufacturing firms in Kenya, it is recommended that the government should review tax incentive policy to widen the scope of tax incentives to support improved financial performance of manufacturing firms in Kenya.

Keywords: *Custom Duty Incentives, Financial Performance, Manufacturing Firms, Kenya*

Influence of Government Intervention Policy on Prison Population in Kenya

Mosoti, D.

Chuka County Government, Kenya

Correspondence: denmosoti@gmail.com

Abstract

The purpose of this study was to examine the extent to which decongestion programs have helped to reduce prison population in Kenya. The study specifically looked at the community service orders on offenders serving short term sentences as way of prison population management. The target population for this study was 800 prison and 30 probation staff in GK prisons and probation departments in Embu, Kakamega, and Eldoret. Proportionate, stratified, and simple random sampling was used to select the samples. A sample size of 282 subjects comprising 266 prison officers and 16 probation officers were included in the study. Primary data was collected using questionnaire which was pilot-tested in Chuka GK Prison to determine its reliability before the actual study. The validity of research instruments was tested using content validity and reliability using Cronbach Alpha. Data analysis methods used for descriptive statistics included frequencies, percentages, and means to summarize raw data. Results were presented using frequency distribution tables. Decongestion programs led to reduction in prison population if well utilized. Consequently, it is advisable that the judicial services should prescribe community-based sentences to curb populating prisons with petty crime offenders whose offenses attract a penalty of fewer than three years of imprisonment or a fine. There is need to study efficacy of executing community service orders by those serving community-based sentences.

Keywords: *Decongestion Programs, Prison.*

The Effect of Longer Account Payable Days and Shorter Account Receivable Days on The Profitability of Small Retail Businesses in Kirinyaga County.

Mwirigi, D.,& Mutiso, A.

¹*Kirinyaga University, Kenya*

Correspondence: Johndouglas.jd92@gmail.com

Abstract

Management of account receivables and payables determines firm's efficiency, and has an effect on profitability and liquidity. Firms may delay payment of debts and lengthen account payable days to optimize working capital. This study sought to establish the effect of shortening account receivable days and lengthening account payable days among small retail business in Kirinyaga County. Operational motives theory, transactions cost theory, and cash conversion theory were used to inform the conceptual framework. Questionnaires were distributed to 40 randomly selected small retail business owners in Kutus, Mwea, and Kerugoya, which are key business hubs in Kirinyaga county. The study utilized a mixed-research research design, and multiple regression and correlation models to analyze the data. It was observed that longer account payable days had a positive, but insignificant effect on profitability ($p=0.478$), while longer account receivable days had a negative, but insignificant effect on profitability ($p=-0.399$). Thus, account receivable and payable days have an insignificant effect on profit. However, lengthening account payable days affects business relationship with suppliers. There is need to negotiate better credit terms with suppliers to take advantage of the profitability associated with longer account payable days without affecting relationship with vendors.

Keywords: *Account Payable Days, Account Receivable Days, Profitability.*

Implications of Physical Accessibility to Markets on Food and Nutrition Security in Agro Pastoral Tharaka Sub region, Kenya

Kinoti K,

Chuka University, Kenya

Correspondence: kinotikibetu@gmail.com

Abstract

In semi-arid rural Kenya among the agropastoral communities, malnutrition and food insecurity remains a real challenge. Open air markets are the main source of food and nutrients consumed by majority households. However, these markets are geographically dispersed forcing households to trek long distances to access these markets. Distance defines accessibility and utilisation of market facilities in agropastoral zones of Kenya. Studies on intra-variation effects of food markets accessibility on nutrition and food security remains scanty, yet market food purchases account for majority of food consumed across urban and rural areas. This study applied spatial modelling to measure physical accessibility to open air periodic food and livestock markets within semi-arid Tharaka sub region and assessed the implications of accessibility on the sub tribe's food and nutrition security. Within this region, malnutrition rates are high as 30% compared to the national average of 20.9% depicting serious vulnerability to acute food shortage. Normative, administrative and geospatial datasets were used in the study. Results showed that physical accessibility to food and livestock markets vary geographically across all 883 villages in the study area. 40.4% of the region's population live in areas with high inaccessibility risks, 36.1% in places with low inaccessibility risks and about 23.5% in areas with moderate inaccessibility risks. This basically means the highest proportion of the population in this region live in area within very high to high inaccessibility risk. The spatial inequity exemplified by high market-to-villages inaccessibility explains the chronic problems of hunger and malnutrition experienced in Tharaka sub region.

Keywords: *Physical Accessibility, Markets, Food and Nutrition Security, Agro Pastoral*

Impact of Music on Fashion. A Case of Apparel Fashion Trends among East African Artists from 2010 To Date

Kimemia, M.

Kirinyaga University, Kenya

Correspondence: mkimemia@kyu.ac.ke

Abstract

Music is a universal language of humanity. It has power to bring positivity and entertainment in people. Different emotions are attached to music due to its ability to easily relate with everything and everyone. Music brings people together in different ways on several occasions because it is a source of communication. It is an ideal way to express feelings which we fail to express verbally. The expressions and emotions attached to music are not only expressible in words but also by the outfit portrayal. There has been notable temporal variability in apparel fashion among East Africa music artists since 2010s. With the advent of more sophisticated technology in music, the reach of East African Music commonly called Bongo has widened and so has the fashion consumed in the music industry. This study sought to examine the impact of music on apparel fashion focusing on trends and variability among Bongo music artists in East African countries with specific focus on Kenya, Tanzania and Uganda. The objectives of the study were to assess the socio-economic determinants of apparel fashion in Bongo music and to make a comparative spatio-temporal analysis of fashion among the three East African counties in the last 12 years. The study used 10 contemporary (bongo) artists sampled from across the three countries. Selection was based on the artists having been consistently in music industry for at least two years to the time of this study. In each country, YouTube views were used to select ten artists with the highest views. The study also used randomly sampled 50 bongo music fans from online following. Employing descriptive techniques, the study used interview schedules, video watching and desktop review to collect data. SPSS was used to analyse quantitative data and findings presented in tables and charts. There was a close relationship between fashion consumption across the three East African countries. While early 2010s had a characteristic larger (buggy) clothes that had a larger body covering, the current fashion in the music industry reveal a total opposite fashion. However, the type of apparel and amount of money spent on fashion varied significantly depending on the artist and the song. Results suggested that artists used expensive apparels to attract increased attention and following particularly online fan base. The style of fashion was determined by market demands. More than 30% of the online fans felt that the fashion used by artists and dancers were more revealing to arouse emotions and attachment to particular songs and artists.

Keywords: *Apparel, Fashion, Bongo Music, Fashion Trend, Spatio-temporal Variability*

Resources for Superior Organization Performance Case of Kirinyaga Technical Institute**(KTI)****Gachichio, M.***Kirinyaga University, Kenya***Correspondence:** mgachichio@kyu.ac.ke**Abstract**

This study sought to assess the effect of human capital and intangible knowledge based resources on organizational performance organization resources on performance. The study presumed resource-based view theory which stipulates that fundamental sources and drivers to firms' competitive advantage and superior performance are mainly associated with the attributes of resources that are valuable and costly-to-copy. Combining or bundling of resources by organizations by configuring them into complex combinations to yield competitive advantage is not highly enhanced in public institutions due to lack of or poor training and low motivation among civil servants leading to poor delivery of services. Having higher levels of human resources capital was strongly associated with performance only when top managers perceive that these resources provide distinctive value to the organization. Organisations use combinations of accumulated tangible and intangible resources of stocks that are owned or controlled by the firm, such as technological assets, capabilities, human, financial, physical and knowledge-based resources that are tied to and controlled by the firm. Descriptive study research design using a census was done and qualitative and quantitatively analysis performed. Results showed that superior performance is achieved by access to and appropriate use of the firm's resources for competitively to achieve superior performance.

Keywords: Resources, Superior Organization Performance, Kirinyaga Technical Institute (KTI).

Evaluation of Training Programmes in Business Organizations.**Kamau, S.***Kirinyaga University, Kenya***Correspondence:** skamau@kyu.ac.ke**Abstract**

Evaluation of training programmes is not always as easy as many organisations perceive. A great deal of training evaluation that is done in many organizations entails evaluating reactions of trainees to the training program which are often expensive to the respective organizations. Like any other investment venture, training should be evaluated by its returns on investment. This measure is however not easy to conduct hence many organizations get content with just a measure of the participants perceived impact of the training. This paper explores the training evaluation approaches that organizations can employ to evaluate return on investments for their training expenses.

Keywords: *Training, Evaluation, Training Programmes, Training Outcomes, Training Appraisal.*

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

Gathitu, C. W¹, Mukulu, E², John Kihoro. J³

^{1,2}Jomo Kenyatta University of Agriculture and Technology, Kenya ³Cooperative University of College of Kenya, Kenya

Correspondence: cmaina@kyu.ac.ke

Abstract

The Government of Kenya initiated a youth enterprise fund by the name Youth Enterprise Development Fund in the year 2006 with one of the objectives as training the youth in entrepreneurship skills. The youths were required to form youth groups and operate youth group based enterprises. In fulfillment of its mandate the YEDF has trained over 180,000 in business development and management skills, 62,000 were trained on business development and entrepreneurship skills. The training focuses on self -belief, self -motivation, entrepreneurship, and leadership. 2,500 youth have been trained on public procurement in Kenya. In spite of massive investment by the government on training youth enterprises the influence of entrepreneurship training on the growth of entrepreneurial youth group based enterprises (YGBE) and the moderating role played by group dynamics in the relationship between YEDF- sponsored training and growth of Youth Group Based Enterprises is unknown. This study therefore investigated the influence of Entrepreneurship skills training on the growth, and the moderating role of groups dynamics, on the relationship between the entrepreneurship skills training and growth of entrepreneurial youth based enterprises. A cross sectional survey design was adopted on a sample of 156 from a population of 255 entrepreneurial youth group based enterprises that have benefited from YEDF training in Nairobi County, Kenya. Questionnaires and interview guides were used to collect data from group leaders. Cronbach Alpha coefficients of 0.7 for variable was attained from the pilot study. Statistical Package for Social Sciences (SPSS) version 21 was used to analyze data. Correlation and regression techniques, analysis of variance (ANOVA) were used to test the study hypotheses. A multiple linear regression model was also used for 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 entrepreneurship skills training had a significant effect on the response variable. The study also found group dynamics to have a significant moderating effect on the relationship between training and growth of entrepreneurial youth group based enterprises in Nairobi County. The study established that group dynamics had predictive effect on the growth of entrepreneurial youth group based enterprises. The study concluded that entrepreneurship skills training minimally but significantly influences the growth of entrepreneurial youth group based enterprises in Nairobi county. The study recommended conducting of Training Need Analysis and establishment of group formation criteria guidelines.

Keywords: *Entrepreneurship Skills Training, Growth, Entrepreneurial Youth Group Based Enterprises*

Effect of Exchange Rates on Trading Volume, Opening Prices and Closing Prices in Nairobi Securities Exchanges

Kairu, R , Wanjiku, C.V, Gloria, C, Mwangi, P, & Githira, C.

University of Embu, Kenya

Correspondence: rosemarywachera99@gmail.com

Abstract

Nairobi Securities Exchanges has a pivotal listing role for local and foreign investors. Furthermore, it promotes economic development through financial intermediation. Due to globalization, heterogenous currencies are adopted. Thus, the current study examined the effect of US dollar, Sterling Pound, Euro, South Africa Rand and Indian Rupee on opening prices, closing prices and trading volume in Nairobi Securities Exchanges. The Study was anchored on purchasing power parity and portfolio balanced theories approach. Causal research design was applied. Daily time series data from June 2021 to October 2021 was collected. The study employed the econometric analysis such as Vector Error Correction Method (VECM), and Vector autoregressive(VAR) model e granger Cointegration Rank test and Granger Causality test to derive the long-run and short-run relationships among the variables. The VAR model results indicated a significant and positive short-run relationship between exchange rate, and trading volume, and the lagged of the exchange rate. E granger Cointegration Rank test revealed the presence of cointegration and long-run relationship among the variables. The outcome of Granger causality test confirmed a bidirectional causal relationship between exchange rates and trading volume. Thus, efforts on structural and institutional reforms are needed for financial sectors in order to deal with the changes caused by exchange rate volatility. Consequently, there is need for adoption of measures that may escalate attractiveness of investment opportunities in Nairobi Securities Exchanges. Moreover, foreign exchange policies adopted in Kenya ought to be in support of stock market development and stabilization of economy and protection of local and foreign investors.

Keywords: *US Dollar, Euro, Sterling Pound, South African Rand, Indian Rupee, Trading Volume, Opening Prices and Closing Prices.*

Inflation Rate and Interest Rate Spread of Commercial Banks in Kenya

Maina, M. W. & Mutiso, A. N.

Kirinyaga University, Kenya

Correspondence: mwmaina@kyu.ac.ke

Abstract

This study aimed at establishing the relationship between inflation and interest rate spread of commercial banks in Kenya. It is anchored on a study "determinant of interest rate spread of commercial banks in Kenya". Though several variables were studied, this paper specifically concentrated on the effects of inflation on interest rate spread of commercial banks in Kenya. Correlation research approach was undertaken. Questionnaires were used to collect data which was analyzed using SPSS Version 19. After running different tests: reliability tests, factor analysis, descriptive tests, Pearson correlation, model of fitness and regression, the findings revealed that inflation has an influence on the interest rate spread of commercial banks in Kenya. The study recommends participation of all the stakeholders on review of existing policies on stability and soundness of the banking industry. Banks should also explore internally and industry driven strategies that mitigate against some of the bank-specific factors associated with higher spreads. Based on the research findings, it was concluded that inflation played significant role in explaining interest rate spread. It is therefore recommended to the government and policy makers to implement sustainable political and macroeconomic environment to boost investors' confidence in the banking sector which would go a long way in reducing interest rate spread.

Keywords: *Interest Rate Spread, Inflation Rate, Interest Rate*

Impact of Tourism on the Economy of Rwanda: Social Accounting Matrix (SAM) Analysis

Odunga, P¹ Odunga, P²

¹*Kirinyaga University, Kenya* ²*Moi University, Kenya*

Correspondence: Podunga5@gmail.com

Abstract

The primary objective of this study was to evaluate the economic impact of tourism and assess the strength of tourism inter-industry linkages in Rwanda's economy for the year 2013/2014. The SAM model was used to estimate the impacts and linkages of tourism in terms of output production, employment generation, labour income earnings and total value creation. The economic models identified and quantified the linkages between different sectors of the economy. The relationships between expenditure and output, and income and employment (direct and indirect) were described by multipliers. Data for analysis was sourced from EORA multi-region input-output table (MRIO) database: <http://www.worldmrio.com/>. 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). Total tourism expenditure/consumption, which triggers direct effects, consists of internal tourism consumption. Internal tourism consumption is an aggregate that describes the size of direct visitor acquisition within a country of reference. Therefore, internal tourism expenditure (a portion of internal tourism consumption) was used as a basis for calculating tourism multipliers and their associated effects. 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 years 2013/2014. Multipliers were decomposed into their various multiplier effects: initial and production effects. About \$286 million worth of internal tourism expenditure/consumption in the economy created 72,000 jobs (13% of economy-wide employment) and generated \$195 million in labour income (6.4% of national labour income), \$381 million in total value addition (6.8% of national total value) and \$803 million in output (7.3% of national output). This study is useful in analysing the effects of changes in tourism expenditure/consumption, effects of policies and regulations that affect tourism activity either directly or indirectly, resource allocation, and policy and management of tourism development strategies. In this study, internal tourism expenditure (a portion of internal tourism consumption) was used as a basis for calculating relevant multipliers and their associated effects. Therefore, future studies can re-estimate the multipliers by considering internal tourism consumption in its entirety. A more robust methodology such as Computable General Equilibrium (CGE) models can be considered for further analysis.

Keywords: *Tourism Satellite Accounts, Tourism Internal Expenditure/Consumption, Social Accounting Matrix, Rwanda.*

SUBTHEME: EDUCATION & LEADERSHIP

Effect of Guidance and Counselling Teachers' Professional Qualifications on Implementation of Guidance and Counselling Services in Baringo Central Sub-County, Kenya

Chemwei, B.¹, Cheruiyot, G.²

¹*Kirinyaga University, Kenya*, ²*Teachers Service Commission, Kenya*

Correspondence: bchemwei@yahoo.com

Abstract

Guidance and counselling is an important part of the school curriculum. This is because of the pressing need of personal, social, educational leisure and work aspects of the students. However, this important service is not sufficiently handled in most schools. In light of this fact, this paper examines the influence of the guidance and counselling teachers' professional qualifications on the implementation of guidance and counselling in Baringo Central Sub-County secondary schools. The study adopted a descriptive survey research design with a sampling frame of 36 secondary schools, 36 principals and 72 teacher-counsellors. The study employed a questionnaire as a means of data collection and the results was analysed using SPSS version 22. Results showed that very few teachers had been fully trained on the interpersonal skills necessary to undertake guidance and counselling within secondary schools. This was bound to negatively affect the implementation of guidance and counselling in the schools. It is recommend that the Ministry of Education and the Teachers' Service Commission should come up with clear policy guidelines on appointment, training of counsellors, workload, remuneration and responsibilities of school counsellors. Further studies should be conducted to determine the factors that influence students' attitude towards seeking counselling services.

Keywords: *Guidance, Counselling, Teachers, Professional Qualification, Implementation, Baringo, Kenya*

The Effectiveness of Blended Learning in Training Agriculture Using Dairy Delta Academy Platform

Yator, J., Kibet, M.K. , Marendich J.

The Eldoret National Polytechnic, Kenya

Correspondence : jackyator@gmail.com

Abstract

The aim of this study was to determine success of blended learning was at the Eldoret National Polytechnic, a TVET institution using Agriculture trainees to determine students' perceptions, problems, and suggestions regarding application of blended learning in general agriculture program using the Dairy Delta Academy platform. A questionnaire containing benefits of online learning, advantages of face-to-face learning, learning assessment, challenges in blended learning, ideas for quality enhancement of blended learning was used. The information gathered was analyzed both descriptively and qualitatively. The majority of students thought that both online and face-to-face modes were beneficial. Internet access was reportedly a major issue. Because this study was limited to students from a single study program, additional studies should be conducted to come up with conclusive observations on students' preferences for blended learning and how they affect students' performance.

Keywords: *Effectiveness, Blended, Learning, Agriculture*

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

Maina, K.¹, Maina M.²

¹*Kenya Medical Training College, Kenya, ²Kirinyaga University, Kenya*

Correspondence : kkamanje@yahoo.co.uk

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 to ensure that 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 students, teachers and key informants from the human rights organizations in Kenya. Data was collected using a structured questionnaire and interviews and analysed using mixed method analysis. Results showed that some of the IEC strategies preferred included drama, videos, discussions and case studies and were found to significantly influence the success of human rights education programmes in Kenyan secondary schools.

Key Words: *Information, Education and Communication, Human Rights Education.*

Undergraduate E-Learning Programmes in the Health Professions: An Integrative Review of Evaluation Standards in Low- and Middle-Income Countries

Mutua M.,M.

University of the Free State, South Africa

Correspondence: mmmutua254@gmail.com

Abstract

Before the Corona virus COVID-19, universities offered blended learning as a mode of study. However, with the closure of all educational institutions, after the pandemic, most of these institutions were required to transition to e-learning to support learning. This transition was challenging to most institutions, as there were no standards to ensure the quality of e-learning. This review of literature, seeks to explore relevant literature and provide insights into the standards for undergraduate e-learning programmes in the health professions. Data was obtained using Online databases MEDLINE, CINAHL with full text, Academic search ultimate, APA PsycInfo, ERIC, health source: Nursing/academic edition, CAB abstracts, Africa-wide information, Sociology source ultimate, and Communication and Mass media complete were searched. Studies pertaining to low- and middle-income countries (LMICs) on standards in evaluating undergraduate e-learning programmes in health professions, published between January 2020 and September 2020 were considered. A two-step process was followed involving three reviewers and guided by an inclusion criterion focused on evaluation of undergraduate e-learning programmes in the health professions. The initial hit produced 503 articles altogether, and six articles that met the inclusion criteria were included in the study. Data was then extracted and analysed and key themes identified. Six key themes related to LMIC standards emerged from the six selected articles namely curriculum planning, proficiency of educator, learner proficiency and attitude, infrastructure for learning, support and evaluation. In this review, standards that have been used for evaluating undergraduate e-learning programmes in health professions in LMICs were synthesized. A gap in standards related to clinical teaching and learning in undergraduate e-learning programmes in the health professions was evident from all the selected articles. Identification of the six unique LMIC standards in this review could guide contextualization of appropriate quality e-learning programmes in the health professions.

Keywords: *E-Learning; Standards; Quality; Health Professions; Undergraduate; COVID-19; Universities*

Curbing Diarrhoea to Tame School Absenteeism Among Pupils in Nairobi Slums: Opportunities Stemming from Hand Washing as a Covid-19 Prevention Measure

¹Ogeto, P. M. ²Mokua P.M

¹Laikipia University, Kenya, ²Kisii University, Kenya

Correspondence: patrickogeto@gmail.com

Abstract

Diarrhoea among school going pupils has been a major cause of absenteeism. Several studies have concluded that primary school pupils miss school due to diarrhoea related illnesses. This is especially so due to poor hygiene and hand washing practices. Prior to Covid-19, several efforts were made to promote the practise of hand-washing. For example, the international hand washing day was meant to promote the practise of washing hands as a way of eliminating disease causing germs. This study examines how the culture of hand-washing to prevent the spread of Covid-19 virus doubles significantly as a diarrhoea preventive measure hence minimizing school absenteeism among primary school pupils in Nairobi slums. This study will be informed by Psychological Effect Theory which is applied to estimate the social consequences of an action on individuals, groups, organizations, communities, and other social units. They assess both positive and negative social impacts, but generally this theory looks at negative social impacts of actions that are proposed for their positive socio-economic impacts in the society. The methodology will include collection of primary and secondary data. Primary data will include oral narratives and information from parents, doctors and teachers. Data will be supplemented with secondary data which will be obtained from journals, books, magazines, among others, for interpretation. The findings of this study will contribute greatly to the growing subject of access to education, health and behavior change hence achieving the Sustainable Development Goals.

Keywords: *Diarrhoea, School Absenteeism, Had-Washing and Covid-19 Prevention*

Mathematics Education and Sustainable Development in Nigeria: A Systematic Review

Lawal, R. F.¹, Dada, F. H.²

^{1,2}Federal College of Education (Technical), Nigeria,

Correspondence: femifolawal256@gmail.com

Abstract

The duration in which an attained development is enjoyed is directly proportional to the degree of conscious strategic planning efforts put in to sustain the development. Mathematics and mathematics education play indisputable roles in development. In a similar vein, mathematics education should find its place of usefulness in sustainable development, especially of developing countries like Nigeria. The main objective of the study was to review online articles on mathematics education and sustainable development in Nigeria, highlighting trends in findings, recommendations and gaps. A systematic review approach was adopted comprising twenty three (23) articles. Results of the review showed that: very few of such studies in Nigeria are online, that 70% of the studies are based on authors' opinions while only 30% are empirical and 70% of the studies were domiciled in the southern part. 52% were co-authored and 53% of all the authors were males. All studies agreed that mathematics education is an indispensable tool in the achievements of sustainable development. Emergent trends in the order of placement of recommendations was that governmental support for sound and quality mathematics education is necessary through provision of funds and manpower, training and retraining of mathematics teachers, upward review and improvement of teachers' conditions of service, welfare and remuneration, supply of ICT and teaching materials, use of only competent professionally trained teachers in mathematics classes and enhancements of students' interest in and attitudes to mathematics in that or very similar order. It is recommended based on the findings of the review that more research collaborations focused on mathematics and sustainable development especially for empirical studies should be carried out in all parts of the country, more especially, in the northern part.

Keywords: Mathematics, Education, Sustainable, Development, Review.

The Relationship between the Teachers' Conduct and the Teachers' Performance in Public Primary Schools in Igembe North Sub-County, Meru County

Gitonga, H. K., Kibaara, T., & Gichohi, P. M.

Kenya Methodist University, Kenya

Correspondence: harrietgitonga68@yahoo.com

Abstract

The Teachers Service Commission has put in place mechanisms to evaluate performance of primary school teachers via the teaching competence standards as outlined in the Performance Appraisal and Development (TPAD). Despite this effort, performance of primary school teachers has continued to raise concerns from a number of stakeholders. There is therefore a need to examine the teaching competence standards in influencing teacher's performance. This study assessed the relationship between the teachers' conduct and teacher's performance in public primary schools in Igembe North Sub-County. Mixed-methods approach, correlational and descriptive survey research designs were adopted. A sample size of 202 teachers, 14 headteachers, and one Sub-County Education Officer participated in the study. A proportionate simple random sampling technique was used in selecting teachers and headteachers, while the Sub-county Education Officer was purposively selected. Data was collected using questionnaires and interview guides whose validity and reliability was verified. Factor analysis, mean and standard deviation correlation and regression analysis were used to analyse quantitative data. Thematic analysis was applied to analyze the qualitative data. Information was presented using tables, figures and narrations and excerpts. The poor state of performance of teachers in public primary schools was attributed to personal factors, school-based factors, government/employer-related factors and parental factors. There was a statistically significant predictive relationship between the teacher's conduct and their performance. There is need for Teachers Service Commission to empower headteachers with requisite skills for nurturing, counselling, and mentoring teachers' conduct. It should also embark on an affordable continuous teacher's development program to amplify professional conduct. Results have enormous implications on leadership, mentorship programs for teachers, and human resources management practices in public primary schools and contribute new knowledge in staff performance and appraisal management.

Keywords: Teacher's Conduct, TPAD, Teacher's Performance, Teaching Competence Standards, Teacher's Performance Management.

Technology Enhanced Design Education Through the Use of Extended Reality Learning Environments

Ndunda, H., K.¹, Lilechi, V. W²

¹Kirinyaga University, Kenya, ²Kenyatta university, Kenya

Correspondence :hildahkoki@gmail.com

Abstract

The current paradigm shifts in education, wherein learners are expected to acquire real-life problem solving skillsscenarios and solve real-life problems presents a significant challenge in design learning institutions. Along with the escalating use of personal computers for visualization and the rapid development of computer image generation in real time, colleges, following the newest technological trends are seeking solutions to reach students through the senses of sight, hearing, and touch. The growing prevalence has given rise to technologies such as extended reality (XR), which includes augmented reality (AR), virtual reality (VR), and mixed reality (MR). Extended reality, as an integrated, hands-on learning tool, has the potential to play a unique role in addressing these educational challenges. It comprises a diverse set of technologies that span a spectrum from real-world surroundings to completely immersive virtual environments. This technology allows learners to get firsthand knowledge of things that are rare, remote, or simply not physical. The concept of virtualizing and enhancing realities through technology advances how learners can get actual experience by visualizing and interacting with the digital world which was previously not possible. Consequently, it can be efficiently used as a design learning tool to enhance the design classroom experience. The goal of this study is to integrate XR basics into existing design education curriculum for learners in art and design schools. This form of integration will help students acquire 21st-century abilities such as decision-making, problem-solving, lifelong learning, creation, innovation design and critical thinking. Using existing knowledge, the prospects of incorporating virtual reality, augmented reality, and mixed reality into higher education learning through experiential learning are explored in this study. In addition, the article will explore the growing demand for, and benefits of, extended reality in design learning, as well as the mechanisms by which these technologies might help accomplish design learning goals.

Keywords: Augmented Reality, Extended Reality, Mixed Reality, Learning Goals, Teaching and Learning, Virtual Reality

COVID - 19: Educational Setbacks, Lessons Learned and Way Forward for Kenya

Ngumbi, E¹., Wasike, J.²

¹Catholic University of Eastern Africa, Kenya, ²Kirinyaga University, Kenya

Correspondence: elizabeth.ngumbi6@gmail.com

Abstract

The COVID - 19 pandemic and its effects on education is a new phenomenon to all on a global level. In Kenya, the situation in schools is not only challenging but has exposed huge gaps in school funding, teachers' roles, involvement of parents, and a huge percentage of learners' inability to take part in remote learning. This paper explored myriad of educational setbacks experienced by schools and some activities that stakeholders are engaging in to alleviate the challenges. It also highlights some of the lessons learnt including huge funding gaps in schools, changing roles of the teacher, the need to increase parental involvement in the education of their children, and the fact that the "one size fits all" type of education does not apply in schools anymore. Lastly, the paper looked at the workable ways and means for some schools during COVID - 19. The study employed a critical review of existing relevant literature to capture information. The collected information was systematically synthesized and thematically discussed. While many schools have worked hard to make technology available for their teachers and learners, they also recognize that technology alone is not sufficient for effective remote learning and teaching during COVID-19.

Keywords: COVID-19; *Educational Setbacks; Lessons Learned; Schools; Teachers' Roles; Parental Involvement; Remote Learning.*

Influence of Parental Ownership Strategies on the Management of Academic Performance in Secondary Schools in Imenti South Sub-County, Meru County, Kenya.

Muiru, A.

Kirinyaga University, Kenya

Correspondence: amuiru@kyu.ac.ke

Abstract

Many parents are not involved in the academic progress of their children hence this study sought to examine the influence of parental ownership on management of academic performance in Imenti South Sub County, Meru County, Kenya. To explain how exactly parent engagement strategies influences the student academic performance, Epistels theory and Bronfen Brenners Ecological Theory were used. The study adopted a mixed methodology approach and concurrent triangulation design. The target population of the study was a total of 17568 respondents consisting of 16800 students, 48 school principals and 720 teachers. Stratified sampling was used to get the 48 principals and purposive sampling to get 720 teachers and 64 students. Data was collected using questionnaires and interview schedules. Piloting of the research instruments was done in 10% of the sample size in the neighboring Igembe Sub-County. Validity was measured by face and content validity while reliability of research instruments was checked through test and retest method, reliability coefficient was computed using Pearson Product correlation coefficient where a coefficient of less than 0.07 was deemed dependable. Qualitative data was analyzed using themes and presented using narratives while quantitative data was analyzed using SPSS version 21 and data presented by way of statistical abstracts like pie charts, bar graphs and frequency tables. Results showed that one of the major reasons that students were not performing well in their academic programs is because many parents are not involved. There is need for increased parental engagement through volunteering, ownership, guidance and support to help improve learner's performance.

Keywords: *Parental Ownership, Strategies, Management, Academic Performance*

Influence of Resources Used in Teaching English Speech Functional Writing Skills among Secondary School Learners in West Pokot County

Koross, B. T.

Turkana University College, Kenya

Correspondence: bkoross@tuc.ac.ke

Abstract

Functional writing is a pragmatic use of language for social and personal expression. It recorded the lowest mean score in the Kenya certificate of secondary education (K.C.S.E) examination for period 2011 to 2019 as revealed by KNEC examination reports with a mean grade below C+. The purpose of the study was to establish Influence of Resources used in teaching English Speech Functional Writing Skills among Secondary School Learners in West Pokot County. The objective of the study was to: establish the Influence of Resources used in teaching English Functional Writing among secondary school learners. The study used descriptive survey and correlation study designs. The study population consisted of 2580 Form 4 students and 34 teachers of English subject from 34 schools. The study used saturated sampling technique to select 31 teachers while Krejcie and Morgan table was used to determine sample size of 334 students who were then randomly sampled. Data was collected using questionnaires and learners' achievement test. Pilot study comprised of 3 teachers of English and 250 students from 3 secondary schools to establish the reliability of instruments through test – retest reliability method. Supervisors from the Department of Educational Communication Technology, and Curriculum Studies of Maseno University ascertained content validity of instruments. Descriptive statistics was used to analyze quantitative data. Results showed that the average student performance in speech writing was below average 46 (sd: 21.7) and the median student mark was 50 (ranging 25-60). There is need for teachers to vary their preference in terms of resources use. It is recommended that teachers use appropriate resources to meet need of the learners' functional writing skills.

Keywords: *Resources, Teaching, Functional Writing*

Challenges Affecting the Control of Examination Malpractices: A Case of Public and Private Universities in Kenya

Ambani, M. Njoka, J., & Kimosop, M.

Karatina University, Kenya

Correspondence: mulongomesh@gmail.com

Abstract

The purpose of this study was to assess the effectiveness of university examinations management in mitigating examination malpractices in Kenya. The objective was to assess the challenges affecting the control of examination malpractices in Public and Private universities in Kenya. The study sought to find if there was significant difference in challenges affecting the control of examination between the public and private universities. The study was guided by Bandura's Self-Efficacy theory. The target population was 40033 respondents. The study was based on the descriptive survey research design. A total of 390 participants was sampled using Kathuri and Pals' sampling table. Purposive, stratified and simple random sampling techniques were used. Data was collected using questionnaires and interview schedules. Cronbach's Alpha Coefficient was calculated to establish the reliability of the instruments, which yielded $r=0.79$ and $r= 0.77$ for students' and examination officers' questionnaires respectively. Experts from the department of education validated the instruments. Data was analyzed using descriptive and inferential statistics. The t-tests calculated yielded $p=0.018$, since $p<0.05$, the null hypothesis was rejected. Overcrowding of students in examination rooms, insufficient number of invigilators, failure to adhere to examination timetables, and the missing of marks were found to be the most prevalent challenges facing the control of examination malpractices in both private and public universities. There is a need to strengthen vigilance in the administration of examinations in universities in Kenya. In addition, Closed Circuit Television (CCTV) cameras should be used in examination rooms and students thoroughly frisked. These recommendations will help in formulation of policies to mitigate examination malpractices in universities globally.

Keywords: *Challenges, Control, Examinations Malpractices, Universities, Kenya*

Attitudes of Members of Tanzania Teachers Union (TTU) Towards the Effectiveness of their Union in Improving their Welfare at Dodoma City Council.**Juma, R.C. Onyango, D***St. Augustine University of Tanzania, Tanzania***Correspondence:** Chikujuma728@gmail.com**Abstract**

The purpose of this study was to assess the attitudes of teachers who are members of Tanzania Teachers Union toward their effectiveness in improving teachers' welfare at Dodoma City secondary and primary school teachers who are members of Tanzania teachers' union and union administrators. 64 participants were sampled among them 50 teachers and 14 union administrators. Questionnaires and interviews were used to collect data. Quantitative data was analysed using descriptive statistics using SPSS version 20 while qualitative data was analysed using a thematic approach. A high number of teachers did not have positive attitudes toward their union. There is need for the unions to work with ministry of local government to improve welfare of teachers to help create positive image to the union. Union officials should also visit schools, interact with teachers and gather information from their members on how to reduce the challenges in their working areas. This to some extent will help members to have positive attitude towards the union for posterity Council. The study employed mixed research approach using convergent parallel design and was guided by social capital theory of Bourdieu 1984. The population of the study comprised public

Keywords: *Trade Union, Social Capital, Welfare, and Effectiveness*

The Behaviour of Land Prices During the Road Planning and Development along (Greater) Eastern Bypass

Kinuthia, H^{1,2}, Majale, C², Letema, S³.

^{1,2,3}*Kenyatta University, Kenya*

¹*Kirinyaga University, Kenya*

Correspondence: letema.sammy@ku.ac.ke

Planning of roads triggers increase in land prices; however, it is construction of roads that causes an upshot of land prices. The study aims at analyzing the trend in land prices from the period the roads were planned, designed and constructed. Data on land prices for the period between 2008 and 2018 was collected from land enterprises through use of structured questionnaires and triangulated with data from land transactions. The change in prices of land was studied before, during and after road construction was done. A steady increase in land prices was observed along Eastern Bypass which was constructed compared to Greater Eastern Bypass and Link Road which had been planned but not developed. The increase in land prices observed along (Greater) Eastern Bypass before the construction of the roads was associated with land speculation. However, one year after completion of construction work on Eastern Bypass, land prices for plot along the 250m buffered doubled and a further 20% in the following year. The national and county governments in Kenya have not explored opportunities of capturing the increasing in land value arising from construction of public infrastructure which can be used in provision of basic infrastructures that will promote land development.

Keywords: *Land Prices, Road Planning and Road Construction*

The Susceptibility of Pupils to Sexual Abuse in Emesa Sub-Location, Kisii County-Kenya

Amadi, O. J.

Maasai Mara University

Correspondence : orucho@mmarau.ac.ke

Abstract

Child sexual abuse (CSA) is both a social and public health concern locally and globally. A mutual mistaken belief on child sexual abuse is that, it is uncommon occurrence committed against girls by male strangers in both rural and urban areas in Kenya. Notwithstanding myriad research on CSA, little is known about its etiology. In the recent past in Kenya, sexual abuse has been noted in schools most of which the perpetrators go scot-free. It occurs at all levels of the society affecting not only girls, but also boys. The purpose of this study therefore was to investigate the susceptibility of pupils to sexual abuse in Emesa sub-location. The study was based on four objectives: To identify the etiology of sexual abuse among pupils in Emesa sub-location in Kisii county, to determine the prevalence rate of sexual abuse among pupils in Emesa sub-location, to explore the awareness level of pupils about sexual abuse in Emesa Sub-location in Kisii County and to examine mitigation strategies of sexual abuse among pupils in Emesa Sub-location in Kisii County. The study was informed by the Attachment Theory which suggests that children's lives are centered initially on their parents, family environment being their primary agent of socialization. Systematic random sampling was used to select the respondents to ensure that the sample was representative. The study utilized descriptive survey design. The target population was 700 pupils out of which a sample size of 100 (14 percent) pupils was selected from three primary schools in Emesa Sub-location, which include: Kabonyo, Nyabisase and Emesa primary schools. The study used questionnaires and interview schedules as tools for data collection. Both qualitative and quantitative data was collected and analyzed by textual analysis and the use of descriptive statistics using SPSS and presented through percentages, means, standard deviations and frequencies respectively. Most perpetrators were not identified but majority were male. It was found that there is great stigma attached to the reporting of child sexual abuse among Pupils. Further, there is a reluctance to bring humiliation to the family if a close family member was implicated. Some boys did not reveal their sexual abuse experience due to fear of causing family embarrassment or separation that is, there was the fear of not being believed or being labelled as an inciter. Pupils depended on these abusive adults for their education and basic needs, which made it very difficult for them to report incidences of sexual abuse. There was also the failure of authorities to deal with perpetrators effectively. There is a significant relationship between the etiology and child sexual abuse since 80.9% of the respondents agreed walking to school, pornographic content in mobile phones and TVs, parental negligence, single parenthood, orphanage, social disorganization and poverty are the main causes of CSA. The study found out that threats from perpetrators were preventing the disclosure of child sexual abuse. The research recommends that research, programs and policies should focus on child protection. The patriarchal narrative of manhood needs to change and boys should read from a different script on their roles and place in the society. A dialogue on what it means to be a man, woman, boy or girl and socially assigned roles should be started. Finally, additional research is needed to identify potential protective contextual factors that can be utilized to dissuade adults from sexually exploiting children. The beneficiary of this study are teachers, parents, clan elders and Social administrators. This study contributes to the knowledge base on the etiology of child sexual abuse, shedding light on the mitigation strategies and informing on culturally competent practice preventing child sexual abuse.

Keywords: Etiology, Awareness, Sexual abuse, Prevalence, Attachment Theory, Susceptibility

Conference Organizing Committee

1) Dr. Jotham Wasike	SPAS/Chair
2) Dr. Agnes Mutiso	SBE/Vice Chair
3) Dr. Josphat Karani	SPAS/Member
4) Dr. Bernard Chemwei	SBE/Member
5) Dr. Paul Waithaka	SPAS/Member
6) Dr. Bridgit Mutuma	SHS/Member
7) Dr. David Nderu	SHS/Member
8) Eng. Senteu Murianka	SET/Member
9) Ms. Evah Maina	SHS/ Member
10) Eng. Rodgers Bosire	SEBE/Member
11) Eng. Moses Mwai	SEBE/Member
12) Dr. Sophia Njeru	SHTT/Member
13) Mr. George Ngorobi	ICT/Member /Website
14) Ms. Angela Alwora	SHS/Member/Secretariat
15) Mr. Simon Gacheru	Library/Member/ Secretariat
16) Ms. Nelly Kathomi	Member/Administrative Support
17) Mr. Francins Kamau	Library/Member

Kirinyaga University

5th Annual International Conference, 2022
CONFERENCE PROGRAMME

Email: conference2022@kyu.ac.ke

Website: www.kyu.ac.ke