



PROGRAMME AND BOOK OF ABSTRACTS

THEME

**INTEGRATION OF INNOVATION AND TECHNOLOGY FOR SUSTAINABLE
INTERDISCIPLINARY COLLABORATION**

VENUE

VIRTUAL PLATFORM OF KIRINYAGA UNIVERSITY

Email: conference2025@kyu.ac.ke



KIRINYAGA UNIVERSITY

8TH ANNUAL INTERNATIONAL CONFERENCE, 2025

MARCH 26TH - 27TH, 2025

SUB THEMES

- EdTech and Digital learning, Inclusive and Equitable Education, Lifelong Learning & Skill Development.
- Artificial Intelligence and Machine Learning, Internet of Things (IoT), Cybersecurity & Data Privacy, Green Technologies, Blockchain & Decentralized Technologies.
- Science and Technology for Sustainable Social Economic Development.
- Global Economic Resilience and Inclusive Growth, Sustainable Business Practices, Green Economy and AI Industry.
- Innovations in Renewable Energy, Climate Resilience, and Environmental Sustainability.
- Engineering and Smart City Technologies for Sustainable and Inclusive Development.
- Telemedicine, Digital Health, Mental Health and Well-being, Personalized Medicine and Genomics.
- Data Science, Applied Mathematics, Mathematics in Cryptography & Cybersecurity, & Mathematical Modelling.
- Sustainable Knowledge Management Practices, Use Experiences for Innovation & Agility.
- Design for Sustainable, Innovation, and Cultural Expression.

GUEST SPEAKER
Prof. Dr. Benson A. Mulemi



Prof. Dr. Benson A. Mulemi is an Associate Professor of Anthropology and Research in Social Sciences. He holds the PhD degree in Social Sciences with a concentration in Medical Anthropology from the University of Amsterdam, Netherlands. He is an independent scholar ; a Fellow Member at the African Studies Centre, Leiden University, Netherlands and member of the Wellcome Trust Medical Humanities Advisory Group Committee. He is a Research Associate at the Center for the Advancement of Scholarship, University of Pretoria, South Africa, and an expert with the Research Executive Agency of the European Commission. He was a virtual Fellow in the African Ecologies Programme at the Leeds Arts and Humanities Research Institute / Leeds University Centre of African Studies of Leeds university, UK in 2023. He was also a Visiting Research Fellow/scholar at the Cambridge University Centre of African Studies and Wolfson College, successively supported by the British Academy and the A G Leventis Foundation & the Smuts Memorial Fund. Prof. Mulemi was a Research Coordinator in the Directorate of Research, Innovation and Graduate Studies; Director of the Directorate, and Acting DVC, Research Innovation and Partnership Division at the Catholic University of Eastern Africa (CUEA). He was the CUEA manager of the African Higher Education Leadership in Advancing Inclusive Innovation for Development project, co-funded by the Erasmus + Programme of the European Union.

PROGRAMME AND BOOK OF ABSTRACTS

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TABLE OF CONTENTS

THEME..... 1

SUB THEMES 2

GUEST SPEAKER..... 3

PREFACE..... 12

 DAY ONE: WEDNESDAY, MARCH 26TH, 2025..... 13

 PROGRAMME..... 13

 MID MORNING SESSION..... 14

 AFTERNOON SESSION..... 18

 DAY TWO: THURSDAY, MARCH 27TH, 2025..... 23

 PROGRAMME..... 23

 MORNING SESSION..... 24

 MID MORNING SESSION..... 29

 AFTERNOON SESSION..... 33

ABSTRACTS..... 36

SUBTHEME: ENGINEERING AND TECHNOLOGY 36

 DEEP LENS: SOLAR-POWERED OFFLINE DIGITAL LEARNING PLATFORM 36

 CONSTRUCTION INDUSTRY OUTPUT GROWTH RATE RESPONSE TO INFLATION RATE IN KENYA 37

STUDY OF MECHANICAL DEFORMATION OF A ZR-CU BASED BMG: EXPERIMENTS AND NUMERICAL STUDIES 38

SUBTHEME: HEALTH MANAGEMENT 39

 DETERMINANTS OF ZINC UTILIZATION IN THE MANAGEMENT OF DIARRHEAL DISEASES AMONG UNDER-FIVE CHILDREN IN KIRINYAGA COUNTY 39

 FUNCTIONAL SEXUAL OFFENSES’ ANALYSIS INFRASTRUCTURE: ITS IMPACT IN SHAPING OUTCOMES OF SEXUAL OFFENSES’ FORENSIC INVESTIGATION IN BUTERE SUB-COUNTY, KAKAMEGA COUNTY, KENYA..... 40

 THE LINK BETWEEN PESTICIDE USE AND RISING CANCER CASES IN KENYA: EVIDENCE, CHALLENGES, AND THE NEED FOR COMPREHENSIVE RESEARCH AND POLICY INTERVENTIONS 41

 DEVELOPMENT OF AN AFFORDABLE AND EFFICIENT PHASE-LOCKED MAGNETO-OPTICAL MALARIA DIAGNOSTIC SYSTEM FOR PRECISE AND RELIABLE DETECTION 42

 ASSESSMENT OF FACTORS INFLUENCING CONTINUOUS PROFESSIONAL DEVELOPMENT EFFECTIVENESS IN CLINICAL PRACTICE AMONG NURSES AND MIDWIVES IN MERU COUNTY - KENYA 44

 AWARENESS OF POSTPARTUM DEPRESSION RISK FACTORS AMONG POST-NATAL MOTHERS IN NYERI COUNTY AND REFERRAL HOSPITAL - KENYA..... 45

 INTERPERSONAL COMMUNICATION (IPC) STYLES IN DOCTOR-PATIENT INTERACTION ASSOCIATED WITH PATIENT SATISFACTION AND ADHERENCE AT THE COAST GENERAL HOSPITAL (CGH)..... 46

 ADHERENCE TO COMPREHENSIVE NEWBORN CARE PROTOCOL BY HEALTHCARE PROVIDERS AND ITS ASSOCIATION WITH GROWTH OUTCOMES IN PRETERM INFANTS 47

CONTRIBUTING FACTORS OF TUBERCULOSIS INFECTION AMONG ADULT MEN IN MWEA-
WEST, KIRINYAGA COUNTY48

MATERNAL AND CHILD WELFARE AMONG STUDENT-MOTHERS AT CHUKA UNIVERSITY: A
SURVEY REPORT49

AN INTEGRATIVE REVIEW OF LITERATURE ON THE SUSTAINABILITY OF ARTIFICIAL
INTELLIGENCE IN NURSING EDUCATION; A GLOBAL PERSPECTIVE50

DIGITAL UNITIES OF MALE PARTNER INVOLVEMENT IN CERVICAL CANCER PREVENTION
AND CONTROL IN KENYA: A QUALITATIVE ANALYSIS.....51

THE DOUBLE BURDEN OF MALNUTRITION AND DIETARY DIVERSITY AMONG FEMALE TEA
PICKERS IN KENYA AND IMPLICATIONS TO HOUSEHOLD NUTRITION SECURITY52

SUBTHEME: MATHEMATICS53

ASSESSING THE ROLE OF POST-SECONDARY EDUCATION LEVEL ON UNEMPLOYMENT
MENACE IN KENYA; A MATHEMATICAL MODELING APPROACH.....53

TRANSITIVITY, PRIMITIVITY, RANK AND SUBDEGREES OF $GL(3, Q)$ ON NON ZERO VECTORS
OVER FQ 54

ACTION OF THE GROUP OF 2×2 INVERTIBLE DIAGONAL MATRICES WITH ENTRIES IN
 $GF(q)$ ON 2-DIMENSIONAL VECTOR SPACE OVER $GF(q)$ 56

ON SUMS OF SQUARES INVOLVING INTEGER SEQUENCE.....57

RANKS, SUBDEGREES, AND SUBORBITAL GRAPHS OF THE PRODUCT ACTION OF AFFINE
GROUPS58

STUDY OF W_{W_3} - CURVATURE TENSOR ON LORENTZIAN PARA-KENMOTSU MANIFOLDS59

ON COUNTING THE NUMBER OF CYCLIC CODES OF LENGTH N OVER PRIME FIELDS.....60

THE CONDITIONS UNDER WHICH THE NORM OF ELEMENTARY OPERATOR OF LENGTH TWO
IS EXPRESSIBLE IN TERMS OF ITS CO-EFFICIENT OPERATORS IN TENSOR PRODUCT OF C^* -
ALGEBRA :AN APPLICATION OF STAMPFLIS MAXIMAL NUMERICAL RANGE61

FINITE SUM OF SINE AND COSINE SERIES.....62

ON FOURIER TRANSFORM OF A BINOMIAL K -FIBONACCI SEQUENCE63

CHARACTERIZATION OF AUTOMORPHISMS OF ZERO DIVISOR GRAPH OF NILRADICALS OF
SOME CLASSES OF LOCAL RINGS64

AN ALGORITHM FOR SOLVING FIXED-POINT PROBLEMS FOR CONTRACTIONS IN HILBERT
SPACES.....65

STUDY OF W_{W_5} - CURVATURE TENSOR ON LORENTZIAN PARA-KENMOTSU
MANIFOLDS66

MODELLING VOLATILITY OF MULTIVARIATE TIME SERIES67

USING VAR-LSTM-GARCH HYBRID MODEL.....67

MATHEMATICAL MODEL OF SEXUAL ORIENTATIONS WITH RECOVERY
CENTERS.....68

SUBTHEME: ICT AND DIGITAL TRANSFORMATION69

DEVELOPMENT AND EVALUATION OF A CLOUD SECURITY FRAMEWORK FOR
KENYAN FINTECHS69

CLOUD SECURITY CHALLENGES AND ASSESSMENT FRAMEWORK FOR
KENYAN FINTECHS70

USER-CENTRIC DESIGN: ISSUES AND CHALLENGES71

AN ALGORITHM FOR RECOGNIZING AND TRANSLATING FINGER-SPELLING-BASED HAND MOVEMENTS TO TEXT AND SPEECH RECOGNITION 72

ARTIFICIAL INTELLIGENCE FOR SUSTAINABLE AGRICULTURE; ENHANCING CROP PRODUCTIVITY THROUGH MACHINE LEARNING IN KENYA..... 73

A FRAMEWORK FOR ENHANCING PERSONALIZED LEARNING OF COMPUTER PROGRAMMING USING LARGE LANGUAGE MODELS 74

ETHICAL QUANDARY OF ARTIFICIAL INTELLIGENCE IN UNIVERSITY EXAMINATIONS PLAGIARISM 75

ARTIFICIAL INTELLIGENCE AND THE SOCIETY: NAVIGATING THE IMPACT OF AI ON SOCIAL JUSTICE 76

A HYBRID DEEP LEARNING MODEL FOR CROP DISEASES AND PEST CLASSIFICATION 77

ARTIFICIAL INTELLIGENCE FOR SUSTAINABLE AGRICULTURE: ENHANCING CROP PRODUCTIVITY THROUGH MACHINE LEARNING IN KENYA..... 78

DIGITAL LITERACY FOR KNOWLEDGE MANAGEMENT: ASSESSING INITIATIVES FOR ENHANCING ACCESS AND UTILIZATION OF DIGITAL RESOURCES: A CASE STUDY OF EGERTON UNIVERSITY LIBRARY 79

IMPLICATIONS OF GENERATIVE ARTIFICIAL INTELLIGENCE ON HIGHER EDUCATION IN KENYA 80

THE EMPATHY OF DIGITAL INSTITUTIONAL REPOSITORY SERVICE PROVISION AT SELECTED UNIVERSITIES IN MERU COUNTY 81

SUBTHEME: INFORMATION & KNOWLDGE MANAGEMENT 82

EXPLORING KNOWLEDGE MANAGEMENT AND INFORMATION TECHNOLOGY AS CATALYSTS FOR INNOVATION IN MSMES: A CASE STUDY OF BUNGOMA COUNTY 82

AN INVESTIGATION OF THE CONTRIBUTION OF PUBLIC UNIVERSITY LIBRARIES TO QUALITY EDUCATION THROUGH DIGITAL INCLUSION IN KENYA 83

KNOWLEDGE TRANSFER AND EMPLOYEE ENGAGEMENT IN BEVERAGE PROCESSING FIRMS IN KENYA 84

HARNESSING DIGITAL TECHNOLOGIES FOR ENVIRONMENTAL INFORMATION AWARENESS AND SUSTAINABLE PRACTICES 85

USING A KNOWLEDGE CAFÉ APPROACH FOR KNOWLEDGE SHARING AND ITS IMPLICATION TOWARDS INNOVATION AND AGILITY 86

UTILIZING DIGITAL TECHNOLOGIES TO ENHANCE INFORMATION ACCESS FOR LIFELONG LEARNING IN PUBLIC LIBRARIES IN NYERI COUNTY, KENYA. 87

EFFECT OF INNOVATIVE CULTURE AND KNOWLEDGE MANAGEMENT IN THE ATTAINMENT OF ENVIRONMENTAL SUSTAINABILITY 88

FACTORS INFLUENCING DIGITAL PRESERVATION PRACTICES; A CASE OF KENYA NATIONAL ARCHIVES AND DOCUMENTATION SERVICE IN KENYA. .90

SUSTAINABLE KNOWLEDGE MANAGEMENT PRACTICES, USER EXPERIENCES FOR INNOVATION AND AGILITY 91

PERSPECTIVES OF LIBRARIANS ON AWARENESS AND READINESS ON INTEGRATION OF ARTIFICIAL INTELLIGENCE FOR LIBRARY OPERATIONS AND SERVICES IN SELECTED UNIVERSITY LIBRARIES IN KENYA 92

EXPLORING THE ROLE OF UNIVERSITY LIBRARIES IN DIGITAL PRESERVATION
ADVOCACY: A CASE STUDY OF SELECTED KENYAN INSTITUTIONS.....93

ENHANCED RESEARCH SKILLS COMPETENCY AND INFORMATION LITERACY
TRAINING AMONG POST GRADUATE STUDENTS IN SELECTED KENYAN
UNIVERSITIES.....94

ROLE OF LIBRARIANS IN GUIDING USERS THROUGH AI-POWERED TOOLS
AND RESOURCES95

SUSTAINABLE KNOWLEDGE MANAGEMENT PRACTICES: USER EXPERIENCE
FOR INNOVATION AND AGILITY96

INFLUENCE OF PERSONAL RESPONSIBILITIES ON PERFORMANCE OF
UNIVERSITY LIBRARY STAFF IN MERU COUNTY97

INFLUENCE OF KNOWLEDGE MANAGEMENT ON INNOVATION AND
COMPETITIVENESS IN HIGHER LEARNING INSTITUTIONS IN KENYA.....98

SUSTAINABLE REFERENCE SERVICES AND USER EXPERIENCE FOR
CREATIVITY AND ADAPTABILITY99

ADOPTION OF RESOURCE DESCRIPTION AND ACCESS (RDA) STANDARDS IN
SELECTED UNIVERSITY LIBRARIES IN KENYA100

LEVERAGING SUSTAINABLE KNOWLEDGE MANAGEMENT PRACTICES AND
USER EXPERIENCES TO ENHANCE INNOVATION AND AGILITY IN POULTRY
FARMING IN KENYA.101

AI-DRIVEN INFORMATION SERVICES: ARE KENYAN UNIVERSITY LIBRARIES READY?102

ABSTRACT..... 102

**REINVENTING ACADEMIC LIBRARIES IN THE ERA OF EDTECH: NAVIGATING CHANGE
AND EMBRACING INNOVATION 102**

ABSTRACT..... 103

SUBTHEME: EDUCATION FOR SOCIETAL DEVELOPMENT 104

INFLUENCE OF TEACHER-LEARNER PSYCHOSOCIAL DYNAMICS ON MENTAL
WELNESS AMONG SECONDARY SCHOOL EDUCATORS IN MATHIRA SUB-
COUNTY, KENYA104

IMPEDIMENTS OF PARENTAL INVOLVEMENT IN THE IMPLEMENTATION OF
COMPETENCY BASED CURRICULUM IN KENYA105

CRAFTING RESILIENT NARRATIVES: THE FUSION OF INFORMATION DESIGN,
SUSTAINABILITY, AND CULTURAL IDENTITY106

MAPPING THE IMPACT OF LIFELONG LEARNING SKILLS AND
TRANSFORMATION OF THE WORLD OF WORK FOR THE CHIEFS WORKING IN
MACHAKOS COUNTY, KENYA107

LEVEL OF COMPETENCE ON DIGITAL LITERACY SKILLS IN JUNIOR
SECONDARY SCHOOLS, KENYA108

EDUCATION TECHNOLOGY IS NOT A LUXURY IN THE 21ST CENTURY, IT IS A
NECESSITY.....109

TEACHERS LIFELONG LEARNING BEHAVIOURS AND DIGITAL LITERACY: A
LITERATURE SYNTHESIS.....110

MEDIA DIPLOMACY AT STAKE: THE TORTUROUS JOURNEY OF THE MEDIA
REGULATORY FRAMEWORK IN KENYA FROM THE COLONIAL ERA TO THE
PUBLIC DIPLOMACY ERA.....111

THE EFFECT OF THE USE OF CHATGPT ON TEACHING AND LEARNING IN UNIVERSITIES IN KENYA.....112

PERSONALITY AND PSYCHOPATHOLOGY AND ACADEMIC ACHIEVEMENT OF UNIVERSITY STUDENTS IN KENYA113

WHAT’S IN A NAME? AN ONOMASTIC DELVE INTO POLITICS OF NICKNAMES IN KENYA.....114

BRIDGING THE DIGITAL DIVIDE IN PROVISION OF BASIC EDUCATION AMONG PASTORALIST: A STUDY OF WEST POKOT COUNTY, KENYA115

INTEGRATION OF EDTECH AND DIGITAL LEARNING IN CURRICULUM IMPLEMENTATION IN PUBLIC LOW COST BOARDING PRIMARY SCHOOLS IN TURKANA COUNTY.....116

LEVERAGING ARTIFICIAL INTELLIGENCE APPLICATIONS AS CATALYSTS FOR MANAGEMENT OF TEACHER TRAINING PROGRAMMES IN PUBLIC UNIVERSITIES IN NAIROBI COUNTY, KENYA117

REDEFINING PARENTAL INVOLVEMENT IN COMPETENCY BASED CURRICULUM IMPLEMENTATION IN KENYA. A CRITICAL REVIEW118

ADAPTABILITY OF PROBLEM-BASED LEARNING (PBL) APPROACHES IN KENYAN UNIVERSITIES IN PREPARATION FOR COMPETENCY-BASED CURRICULUM (CBC) IN KENYA.....119

EXPLORING ENDEARING METAPHORS AMONG SWAHILI YOUTHS IN MOMBASA COUNTY, KENYA: INSIGHTS FROM CONCEPTUAL MAPPINGS.....120

INFLUENCE OF USABILITY SKILLS OF SMARTPHONES ON THE PSYCHOLOGICAL WELL-BEING OF UNIVERSITY STUDENTS AT RONGO UNIVERSITY, KENYA.....121

ATHARI YA UBINAFAISHAJI WA MAMLAKA NA RASILMALI ZA UMMA KWA WATAWALIWA KATIKA RIWAYA YA MBIO ZA SAKAFUNI122

FASIHI YA KISWAHILI KAMA KICHOCHEO CHA UHAMASISHAJI WA GEN Z KUHUSU MAPINDUZI NCHINI KENYA123

AN INVESTIGATION INTO THE CHALLENGES FACED BY STUDENTS WITH DISABILITIES IN ACCESSING LECTURES AT UNIVERSITIES IN KENYA: IMPLICATIONS FOR INCLUSIVE EDUCATION124

PROSPECTIVE TEACHER EDUCATOR PROFESSIONAL DEVELOPMENT THROUGH CREATION OF MULTIMEDIA CASE STUDIES125

SUBTHEME: PHYSICAL AND NATURAL SCIENCES..... 126

INTERGRATING SCIENCE AND TECHNOLOGY FOR SUSTAINABILITY: MODELLING HEAVY METAL BEHAVIOUR IN RIVER ECOSYSTEMS.....126

HUMAN INDUCED CLIMATE CHANGE: CAPTURING IT RIGHT USING AI.....127

PHENOLIC ECOTOXINS IN RIVER WATER: SURVEY ON KNOWLEDGE AND PRACTICES OF ROAD-SIDE FOOD VENDORS OPERATING ALONG RIVER CHANIA BANK FRINGES IN THIKA SUB-COUNTY, KENYA.....128

EFFECTS OF *WITHANIA SOMNIFERA* ROOT EXTRACTS ON SEROTONIN SECRETION IN SWISS ALBINO MICE129

EXPERIMENTAL EVALUATION OF BIOGAS YIELD FROM WATER HYACINTH AND FISH OFFAL CO-DIGESTION.....130

DESIGN OF LOW-COST EYE PHANTOMS AND ITS CHARACTERISATION USING ADAPTIVE OPTICS.....131

LINEAMENT EXTRACTION USING GRAVITY DATA IN OLKARIA GEOTHERMAL FIELD, KENYA132

BACTERIAL CELLULOSE COMPOSITES AS POTENTIAL WOUND DRESSING ALTERNATIVE133

COMPARATIVE PERFORMANCE AND STATISTICAL VALIDATION OF MOBILENETV2 AND SHUFFLENET FOR MULTI-CLASS CROP DISEASE CLASSIFICATION134

CONTRIBUTION OF INDIGENOUS AGRICULTURAL PRACTICES TO CLIMATE CHANGE RESILIENCE IN MOGOTIO SUB-COUNTY, BARINGO, KENYA136

HIGH-ORDER HARMONIC GENERATION IN A TWO-COLOR LASER FIELD: A COMPUTATIONAL STUDY.....137

SUBTHEME: BUSINESS AND ECONOMIC TRANSFORMATION 138

INFLUENCE OF KNOWLEDGE ACQUISITION ON HUMAN RESOURCE PLANNING IN THE PUBLIC SERVICE COMMISSION OF KENYA138

INFLUENCE OF STRATEGIC HUMAN CAPITAL PRACTICES ON EXTERNAL LABOUR MOBILITY IN PUBLIC LEVEL FIVE HOSPITALS IN KENYA139

INTEGRATING LOCAL PERSPECTIVES AND TECHNOLOGICAL INNOVATIONS FOR SUSTAINABLE DEVELOPMENT IN MARGINALIZED PASTORALIST COMMUNITIES; LESSONS FROM EAST POKOT140

ROLE OF CULTURAL EXPRESSION, COLLABORATIVE INNOVATION, AND TECHNOLOGICAL INTEGRATION IN ACHIEVING SUSTAINABLE DESIGN FOR AFFORDABLE HOUSING IN NAIROBI COUNTY, KENYA141

STRATEGIC WORK-LIFE BALANCE AND EXTERNAL LABOR MOBILITY IN PUBLIC LEVEL FIVE HOSPITALS IN KENYA142

POST COVID-19 HUMAN RESOURCE MANAGERS IN ORGANIZATIONS: A CRITICAL REVIEW OF LITERATURE.....143

MODERATING EFFECT OF PERCEIVED ORGANIZATIONAL SUPPORT ON THE INFLUENCE OF STRATEGIC HEALTH AND SAFETY PRACTICES ON EXTERNAL LABOUR MOBILITY IN PUBLIC LEVEL FIVE HOSPITALS IN KENYA144

MODERATING ROLE OF ENTREPRENEURIAL PASSION IN THE RELATIONSHIP BETWEEN RESOURCE INNOVATION AND PERFORMANCE OF PHARMACEUTICAL MANUFACTURING FIRMS IN KENYA145

EFFECT OF BUDGETARY CONTROL SYSTEMS ON FINANCIAL PERFORMANCE OF PUBLIC UNIVERSITIES IN KENYA146

FINANCIAL INCLUSION AND STOCK MARKET DEVELOPMENT IN KENYA147

MODERATING ROLE OF FUND SIZE ON THE RELATIONSHIP BETWEEN LOSS AVERSION AND PORTFOLIO FINANCIAL PERFORMANCE OF MUTUAL FUNDS IN KENYA.....148

THE PARADIM SHIFT TOWARDS SUSTAINABLE FINANCE: A REVIEW OF LITERATURE IN KENYA AND BEYOND149

IMPACT OF TECHNOLOGY ON THE PERFORMANCE OF HEALTH PRACTITIONERS IN PUBLIC HEALTH FACILITIES IN KIRINYAGA COUNTY, KENYA150

FINANCIAL INNOVATIONS AND SUSTAINABILITY OF COMMERCIAL BANKS IN KENYA.....151

IMPACT OF INNOVATION AND ARTIFICIAL INTELLIGENCE ON KNOWLEDGE MANAGEMENT PRACTICES IN THE TELECOMMUNICATION SECTOR IN KENYA: A CASE OF AIRTEL KENYA152

INFLUENCE OF SOLID WASTE MANAGEMENT ON CUSTOMER SATISFACTION IN STAR-RATED HOTELS IN MT. KENYA REGION.....153

DETERMINANTS OF THE CHOICE OF MARKETING CHANNEL INTERMEDIARY FOR GREEN TEA LEAVES IN KIAMBU COUNTY, KENYA154

CULTURAL AMBIDEXTERITY AND SUPPLY CHAIN RESILIENCE OF MULTINATIONALS IN KENYA155

EXAMINING THE ROLE OF UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY (UTAUT) IN THE USE OF MOBILE PAYMENT SYSTEMS IN KENYA156

INTEREST RATES VOLATILITY AND COMMERCIAL BANKS PROFITABILITY IN KENYA157

IMPACT OF TOURISM ON THE ECONOMY OF RWANDA: A CGE APPROACH...158

DETERMINANTS OF GREEN FDI ATTRACTION IN AFRICA: EVIDENCE FROM EASTERN AFRICA159

THE ROLE OF FORTIFIED TEA BASED FOOD PRODUCTS IN PROMOTING HEALTHY, INNOVATIVE AND SUSTAINABLE FOOD SYSTEMS IN KENYA.....160

EFFECT OF TYPE OF CRIME SCENE ON LATENT FINGERPRINT PROCESSING IN CRIMINAL INVESTIGATIONS IN KENYA.....161

ENVIRONMEANTAL ACTIVITIES AND PERFORMANCE OF LISTED COMMERCIAL BANKS IN KENYA162

EFFECTS OF POPULATION GROWTH ON URBAN INFRASTRUCTURE AND SERVICES: A CASE OF NAKURU CITY, KENYA163

ENVIRONMEANTAL ACTIVITIES AND PERFORMANCE OF LISTED COMMERCIAL BANKS IN KENYA164

A REVIEW OF EMPIRICAL LITERATURE ON CREATIVE ACCOUNTING.....165

INFLUENCE OF COMMERCIAL BANKS' WEIGHTED INTEREST RATE ON CONSTRUCTION INDUSTRY GROWTH RATE IN KENYA166

CONFERENCE ORGANIZING COMMITTEE MEMBERS167

PREFACE

As we embark on the 8th Annual International Virtual Conference of Kirinyaga University, it is with great pleasure and anticipation that we introduce the overarching theme of our gathering: "Integration of Innovation and Technology for Sustainable Interdisciplinary Collaboration."

In an ever-evolving world shaped by both challenges and opportunities, the need for adaptive leadership has never been more critical. This theme serves as a guiding beacon, illuminating pathways towards a future where innovation, resilience, and inclusivity define our progress.

Our conference delves into a diverse array of sub-themes, each representing a vital pillar of societal advancement. These include EdTech and Digital Learning, Artificial Intelligence and Emerging Technologies, Sustainable Business Practices, Innovations in Renewable Energy, Engineering and Smart City Technologies, Telemedicine and Digital Health, Data Science and Applied Mathematics, Sustainable Knowledge Management, and Design for Innovation and Cultural Expression. This comprehensive exploration reflects the interconnectedness of disciplines and the imperative of collaborative solutions.

I extend my heartfelt gratitude to the University Management and the dedicated members of the organizing committee. Their unwavering commitment and tireless efforts have transformed this vision into a vibrant platform for intellectual exchange and collaborative inquiry.

As we convene virtually from March 26- 27, 2025, let us seize this opportunity to engage in meaningful dialogue, foster lasting connections, and inspire transformative action. Together, let us chart a course towards a future where adaptive leadership fuels sustainable development and societal progress.

Dr. Jotham M. Wasike

Chairperson

DAY ONE: WEDNESDAY, MARCH 26TH, 2025

Dr. Jotham M. Wasike (Coordinator): Email: jwasike@kyu.ac.ke

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PROGRAMME

TIME: 8.30AM - 4.30PM

TIME	ACTIVITY
8.00am- 8.30 am	Conference Registration Familiarization with the Conference Programme
8:30 am - 8: 40 am	Welcoming Remarks- Deputy Vice Chancellor (ARSA), Kirinyaga University Prof. Charles, O. A. Omwandho, Ph.D
8: 40 am - 9.00 am	Opening Remarks - Vice Chancellor, Kirinyaga University Prof. Mary Ndung'u, Ph.D
9.00- 10.30 am	Guest Speaker Prof. Benson Mulemi Presentation: Grants Mobilization as a Catalyst for Innovation: Leveraging Multidisciplinary Collaboration for Sustainable Research Impact.
10.30 am-11am	Tea/Health Break
11.am-1.00 pm	Parallel Sessions and Plenary
1.00pm - 2.00 pm	Lunch/Health Break
2.00pm-4.30 pm	Parallel Sessions and Plenary
4.30pm	Closing/Tea

MID MORNING SESSION

11.00PM - 1.00PM

PARALLEL SESSIONS/ PLENARY

SUB-THEME	ENGINEERING AND TECHNOLOGY
Chairperson	Eng Moses Mwai/Eng. Rodgers Bosire
Rapporteur	Mr. Job Kabia

1. **Muchira I., Mwaniki I. C.** (Kirinyaga University, Co-operative University of Kenya, Kenya). Deep Lens: Solar-Powered Offline Digital Learning Platform.
2. **Mbusi, E.T.** (Kirinyaga University, Kenya). Construction Industry Output Growth Rate Response to Inflation Rate in Kenya
3. **Bosire,R., Muvengei. M., Mutua.,M** (Kirinyaga University) Study of Mechanical Deformation of A Zr-Cu Based Bmg: Experiments and Numerical Studies

SUB-THEME	ICT AND DIGITAL TRANSFORMATION
Chairperson	Dr. Josphat Karani
Rapporteur	Ms. Grace Kimani

1. **Maingi, M., Goko, T.** (Masinde Muliro University of Science & Technology, Kenya). Determinants of Green FDI Attraction in Africa: Evidence from Eastern Africa.
2. **Ochango, V. M., Wambugu, G. M., Oirere, A. M.** (Murang'a University of Technology, Kenya). A Hybrid Deep Learning Model for Crop Diseases and Pest Classification.
3. **Omieno, O. A., Mwikya, J. R., Ngarenon T.** (African Institute for Mathematical Sciences (Aims), Senegal, Kirinyaga University, Kenya). Development and Evaluation of a Cloud Security Framework for Kenyan Fintechs.
4. **Paipai, H.,Mukunga, C.** (Kirinyaga University, Kenya). An Algorithm for Recognizing and Translating Finger-Spelling-Based Hand Movements to Text and Speech Recognition.

SUB-THEME	HEALTH MANAGEMENT
Chairperson	Dr. Dennis Butto
Rapporteur	Mr. Kenny Kamau

1. **Ngari, C. W.** (Kirinyaga University, Kenya). A Novel Model for Transmission Dynamics of Meningitis Incorporating Vaccination and Treatment Using Counterfeit and Non-Counterfeit Drugs.
2. **Odhiambo, R., Marwa, I.** (Kirinyaga University, Kenya). Assessment of Factors Influencing Continuous Professional Development Effectiveness in Clinical Practice Among Nurses and Midwives in Meru County, Kenya.
3. **Mwangi, L.** (Kirinyaga University, Kenya). Determinants of Zinc Utilization in the Management of Diarrheal Diseases Among Under-Five Children in Kirinyaga County.

SUB-THEME	MATHEMATICS
Chairperson	Dr. Jeremiah Kinyanjui
Rapporteur	Ms. Caroline Kamotho

1. **Mburu F. N., Njori P. W., Gitonga, C. N.** (Kirinyaga University, Kenya). Study of W_3 - Curvature Tensor on Lorentzian Para-Kenmotsu Manifolds.
2. **Mburu F. N., Njori P. W., Gitonga, C. N.** (Kirinyaga University, Kenya). Study of W_5 - Curvature Tensor on Lorentzian Para-Kenmotsu Manifolds.
3. **Mude L. H., Ndung'u K. J., Kayiita Z. K.** (Kirinyaga University, Kenya). On Sums of Squares Involving Integer Sequence.

SUB-THEME	NATURAL AND PHYSICAL SCIENCES
Chairperson	Dr. Joseph Muna
Rapporteur	Ms. Lucy Kamau

1. **Ayaga, S. V., Rurimo, G. K., Kinyua, D.** (National Institute of Optics and Lasers, Multimedia University of Kenya, Kirinyaga University, Kenya). Design of Low-Cost Eye Phantoms and Its Characterisation Using Adaptive Optics.

2. **Bosire, F.** (Rongo University, Kenya). Experimental Evaluation of Biogas Yield from Water Hyacinth and Fish Offal Co-Digestion.
3. **Muriuki B. G., Lelmen E., Mwangi E. M., Waithaka P. N.** (Egerton University, Kirinyaga University, Kenya). Effects of *Withania Somnifera* Root Extracts on Serotonin Secretion in Swiss Albino Mice.
4. **Njoroge S. M., Kinyua D. M., Wahogo, C.** (Karatina University, Kirinyaga University, Kenya). High-Order Harmonic Generation in a Two-Color Laser Field: A Computational Study.
5. **Kaile, D. E., Njoroge, S. M., & Rurimo, G. K.** (Multimedia University of Kenya, Karatina University, Kenya). Generation of polarized digital holograms by varying the polarization angle of objective beam and reference beam.

SUB- THEME	BUSINESS AND ECONOMIC TRANSFORMATION
Chairperson	Dr. Agnes Mutiso
Rapporteur	Mr. Dennis Kanyingi

1. **Odunga, P.** (Kirinyaga University, Kenya). Impact of Tourism on the Economy of Rwanda: A Cge Approach
2. **Wafula, D. S., Alala, B.** (Masinde Muliro University of Science and Technology, Kenya). The moderating role of fund size on the relationship between herd behavior and portfolio financial performance in Kenya.
3. **Mungai, D. K.** (Kirinyaga University, Kenya). Effect of Budgetary Control Systems on Financial Performance of Public Universities in Kenya.
4. **Mutiiria, N. G., Wambugu, H., Maina, M.** (Kirinyaga University, Kenya). Determinants of the Choice of Marketing Channel Intermediary for Green Tea Leaves in Kiambu County, Kenya.
5. **Oloo A. O.** (Jomo Kenyatta University of Agriculture & Technology, Kenya). Cultural Ambidexterity and Supply Chain Resilience of Multinationals in Kenya.

SUB - THEME	EDUCATION FOR SOCIETAL DEVELOPMENT
Chairperson	Prof. Jane Kerubo
Rapporteur	Ms. Jane Muya

1. **Cheruiyot, B.** (University of Eldoret, Kenya). Effect of Teachers Lifelong Learning Behaviours and Digital Literacy: A Literature Synthesis.
2. **Nderitu, N.** (Kirinyaga University, Kenya). Leveraging Artificial Intelligence Applications as Catalysts for Management of Teacher Training Programmes in Public Universities in Nairobi County, Kenya.
3. **Munyaya, E. J.** (Pwani University, Kenya). Crafting Resilient Narratives: The Fusion of Information Design, Sustainability, and Cultural Identity.
4. **Chemwei, B.** (Kirinyaga University). Impediments of Parental Involvement in the Implementation of Competency Based Curriculum in Kenya.

SUB-THEME	INFORMATION&KNOWLEDGE MANAGEMENT
Chairperson	Dr. Mutua Kilai
Rapporteur	Ms Esther Wanjira

1. **Nthoki, M. J., Ogalo, J. O., Njuguna, A., Obunde, J. A.** (Kirinyaga University, Kisii University, Kenya). Factors Influencing Digital Preservation Practices: A Case of Kenya National Archives and Documentation Service, Kenya.
2. **Ndung'u, H., Munyao, V.** (Kirinyaga University, Kenya). Sustainable Knowledge Management Practices, User Experiences for Innovation and Agility.
3. **Wanjira, E. W.** (Kirinyaga University, Kenya). Enhancing Research Competency in Postgraduate Students Through Research Skills and Information Literacy Training in Selected Kenyan Universities.
4. **Guto, R¹, Obunde, J. A².** (¹Chuka University, ²Kirinyaga University, Kenya). Using A Knowledge Café Approach for Knowledge Sharing and Its Implication Towards Innovation and Agility.

AFTERNOON SESSION
2PM -4.30PM
PARALLEL SESSIONS/ PLENARY

SUB-THEME	ICT AND DIGITAL TRANSFORMATION
Chairperson	Dr. Kennedy Malanga
Rapporteur	Mr. Harrison Karani

1. **Omieno, O. A¹, Mwikya, J. R², Ngarenon T².** (1African Institute for Mathematical Sciences (AIMS), Senegal, 2Kirinyaga University, Kenya). Cloud Security Challenges and Assessment Framework for Kenyan Fintechs.
2. **Ishmael, N. A¹, Ombuya, D².** (1Zetech University, 2Kabarak University, Kenya). Ethical Quandary of Artificial Intelligence in University Examinations Plagiarism.
3. **Mboya, F. M., Wambugu, G. M., Oirere, A. M., Omuya, E. O., Musyoka, F. M., Gikandi, J. W.** (Muranga University of Science and Technology, Kenya). A Framework for Enhancing Personalized Learning of Computer Programming Using Large Language Models.

SUB-THEME	HEALTH MANAGEMENT
Chairperson	Prof. Laura Wangai
Rapporteur	Ms. Mercy Njuguna

1. **Odhiambo, R., Marwa, I.** (Kirinyaga University, Kenya). Awareness of Postpartum Depression Risk Factors Among Post-Natal Mothers in Nyeri County and Referral Hospital, Kenya.
2. **Ratanya, S.** (Technical University of Mombasa, Kenya). Interpersonal Communication (IPC) Styles in Doctor-Patient Interaction Associated with Patient Satisfaction and Adherence at the Coast General Hospital (CGH).

3. **Njagi, J. Mugambi M., Kangara, H. W.** (Chuka University, Kenya). Maternal and Child Welfare among Student-Mothers at Chuka University: A Survey Report.

SUB-THEME	MATHEMATICS
Chairperson	Dr. Zachary Kayiita
Rapporteur	Mr. Pancras Ongili

1. **Kiplagat, P., Mude L. H., Kayiita Z., K., Kinyanjui, J.N.** (Kirinyaga University, Kenya). Characterization of Automorphisms of Zero Divisor Graph of Nilradicals of Some Classes of Local Rings.
2. **Owino, J. O.** (Technical University of Kenya, Kenya). On Fourier Transform of a Binomial K -Fibonacci Sequence.
3. **Okelo, B.** (Jaramogi Oginga Odinga University of Science and Technology, Kenya). An Algorithm for Solving Fixed-Point Problems for Contractions in Hilbert Spaces.
4. **Kazibwe J. C., Nyaluke. K. W., Kimani. P.** (University of Embu, Kenya). Action of the Group of 2×2 Invertible Diagonal Matrices With Entries in $GF(q)$ on 2-Dimensional Vector Space Over $GF(q)$.

SUB-THEME	NATURAL AND PHYSICAL SCIENCES
Chairperson	Dr Agatha Wagutu
Rapporteur	Mr. Peter Muiru

1. **Njagi, I., Orina, I., Kareru, P., Njenga, P. Nyariki, J.** (Technical University of Kenya, Jomo Kenyatta University of Agriculture & Technology, Kenya). Bacterial Cellulose Composites as Potential Wound Dressing Alternative.
2. **Kinyanjui, T. N., Njuguna, P., Tanui, V., & Okari, Z.** (Karatina University, Kenya). Comparative Performance and Statistical Validation of Mobilenetv2 and Shufflenet for Multi-Class Crop Disease Classification.

SUB-THEME	BUSINESS AND ECONOMIC TRANSFORMATION - PANEL A
Chairperson	Dr. David Njoroge
Rapporteur	Mr. Bonface Kamau

1. **Maina, K.J., Wanjau K. L. Kyalo, T. N.** (State Department of Vocational & Technical Training, Karatina University, Kenya). The Moderating Role of Entrepreneurial Passion in the Relationship Between Resource Innovation and Performance of Pharmaceutical Manufacturing Firms in Kenya.
2. **Kamau, J.K., Muchangi D. J., Mutiso, A.** (Kirinyaga University, Kenya). Moderating Effect of Perceived Organizational Support on the Influence of Strategic Health and Safety Practices Practices on External Labour Mobility in Public Level Five Hospitals in Kenya.
3. **Onsongo, E. N.** (Kisii University, Kenya). Post Covid-19 Human Resource Managers in Organizations: A Critical Review of Literature.
4. **Kabata, D.** (Kirinyaga University, Kenya). Examining the Role of Unified Theory of Acceptance and Use of Technology (Utaut) in the Use of Mobile Payment Systems in Kenya.

SUB-THEME	BUSINESS AND ECONOMIC TRANSFORMATION - PANEL B
Chairperson	Dr. Mary Maina
Rapporteur	Mr Collins Musyoka

1. **Maina, E. W. Nkanata, S. N.** (Kirinyaga University, Kenya). Impact of Innovation and Artificial Intelligence on Knowledge Management Practices in the Telecommunication Sector in Kenya: A Case of Airtel Kenya.
2. **Wanjiru C. G., Gesage B., Ann K.** (Karatina University, Cooperative University of Kenya). Influence of Solid Waste Management on Customer Satisfaction in Star-Rated Hotels in Mt. Kenya Region.

3. **Muigai, R. G., Muriithi, J. G.** (Kirinyaga University, Africa International University, Kenya). The Paradigm Shift Towards Sustainable Finance: A Review of Literature in Kenya and Beyond.
4. **Njoroge D.I, Nkanata S. Wainaina G.** (Kirinyaga University, Kenya). Impact of Technology on the Performance of Health Practitioners in Public Health Facilities in Kirinyaga County, Kenya.

SUB-THEME	EDUCATION FOR SOCIETAL DEVELOPMENT
Chairperson	Dr. Ann Muiru
Rapporteur	Mr. James Kamau

1. **Andiema, N. C.** (University of Eldoret, Kenya). Bridging the Digital Divide in the Provision of Basic Education Among Pastoralists: A Study of West Pokot County, Kenya.
2. **Gitumu, M. W., Njoka J. N., Githui, P.** (Karatina University, Taita Taveta University, Kenya). Influence of Teacher-Learner Psychosocial Dynamics on Mental Wellness Among Secondary School Educators in Mathira Sub-County, Kenya.
3. **Ntalala, S.** (Kirinyaga University, Kenya). What’s in a Name? An Onomastic Delve into Politics of Nicknames in Kenya.
4. **Wamuya, J. , Wa Ngula, K.** (Chuka University, Kenya). Media Diplomacy at Stake: The Torturous Journey of the Media Regulatory Framework in Kenya from the Colonial Era to the Public Diplomacy Era.

SUB-THEME	INFORMATION & KNOWLEDGE MANAGEMENT
Chairperson	Dr. Ephantus Mwangi
Rapporteur	Ms .Shirley Nangami

1. **Njuguna A. Muthoka, J. N.** (Kirinyaga University, Kenya). Harnessing Digital Technologies for Environmental Information Awareness and Sustainable Practices.

2. **Matasio, J. F¹. Cheruiyot, E².** (¹Kenya Revenue Authority, ²Kabarak University, Kenya). Knowledge Transfer and Employee Engagement in Beverage Processing Firms in Kenya.
3. **Sitati, S., Waswa, E.** (Kibabii University, Kenya). Exploring Knowledge Management and Information Technology as Catalysts for Innovation in MSMEs: A Case Study of Bungoma County.

DAY TWO: THURSDAY, MARCH 27TH, 2025

Dr. Grace Kiiru (Coordinator)

Dr. Wanjiku Njoroge (Co-Coordinator)

PROGRAMME

TIME	ACTIVITY
9.00 am - 10.30 am	Parallel Sessions/Plenary
10.30am-11.00 am	Tea/Health Break
11.00 am-1.00pm	Parallel Sessions/Plenary
1.00pm- 2.00pm	Health Break
2.00pm-3.30 pm	Parallel Sessions/Plenary
3.30 pm - 3.40pm	Closing Remarks from Deputy Vice Chancellor (ARSA), Kirinyaga University Prof. Charles O. Omwandho, Ph.D
3.40pm - 4.00pm	Closing Remarks Vice Chancellor, Kirinyaga University, Prof. Mary W. Ndung'u, PhD
4.00pm - 4.10pm	Announcements /Issuance of Certificates
4.10pm - 4.20pm	Vote of thanks by Representative of Participants
4.20pm - 4.30pm	Vote of thanks from Coordinator Dr. Grace Kiiru
4.30 pm	End of the Conference

MORNING SESSION

9:00 AM- 10:30 AM

PARALLEL SESSIONS/ PLENARY

SUB-THEME	ICT AND DIGITAL TRANSFORMATION
Chairperson	Dr. James Mwikya
Rapporteur	Mr. Harrison Karani

1. **Kimoriot, M. J., Masinza, F. L., Lusala, H. L.** (Kenya Methodist University, Kenya, Garissa University, Kenya). Influence of Personal Responsibilities on the Performance of the Staff of University Libraries in Meru County.
2. **Ogalo, J. O.** (Kisii University, Kenya). User-Centric Design: Issues and Challenges.
3. **Ogalo, J. O., Wabwire, J.** (Kisii University, Kenya). Artificial Intelligence and the Society: Navigating the Impact of AI on Social Justice.

SUB-THEME	HEALTH MANAGEMENT
Chairperson	Dr. Wanjiku Njoroge
Rapporteur	Ms. Mercy Njuguna

1. **Akinyi, J., Rurimo, G. K., Kinyua, D. M.** (Multimedia University of Kenya, Kirinyaga University, Kenya). Development of an Affordable and Efficient Phase-Locked Magneto-Optical Malaria Diagnostic System for Precise and Reliable Detection.
2. **Muchiri, N. M., Ochami, D.** (Karatina University, Kenya). The Role of Fortified Tea Based Food Products in Promoting Healthy, Innovative and Sustainable Food Systems in Kenya.
3. **Alwora, A., Butto A., Marwa, I.** (Kirinyaga University, Kenya). Functional Sexual Offenses' Analysis Infrastructure: Its Impact in Shaping Outcomes of Sexual Offenses' Forensic Investigation in Butere Sub-County, Kakamega County, Kenya.

SUB-THEME	MATHEMATICS
Chairperson	Dr. Hussein Lao
Rapporteur	Mr. Pancras Ongili

1. **Kitavi, D. M.** (University of Embu, Kenya). Finite Sum of Sine and Cosine Series.
2. **Kimeu, D. B., Ndungu, K. J., Kayiita, Z. K.** (Kirinyaga University, Kenya). The Conditions Under Which the Norm of Elementary Operator of Length Two is Expressible in Terms of Its Co-Efficient Operators in Tensor Product of C^* -Algebra : An Application of Stampfli's Maximal Numerical Range.
3. **Agwanda, S. M¹., Kimani, P²., Nyaluke, W. K².** (Kenyatta University, University of Embu, Kenya). Ranks, Subdegrees, and Suborbital Graphs of the Product Action of Affine Groups.
4. **Kamuri, P.** (Kirinyaga University, Kenya). Mathematical Model of Sexual Orientations with Recovery Centers.

SUB-THEME	NATURAL AND PHYSICAL SCIENCES
Chairperson	Dr. Mariah Onditi
Rapporteur	Mr. Peter Muiru

1. **Mwendwa, P. K.** (Egerton University, Kenya). Contribution of Indigenous Agricultural Practices to Climate Change Resilience in Mogotio Sub-County, Baringo, Kenya.
2. **Njiru, S. N.** (Kenyatta University, Kenya). Integrating Science and Technology for Sustainability: Modelling Heavy Metal Behaviour in River Ecosystems.
3. **Githinji, E. W.** (Jomo Kenyatta University of Agriculture and Technology, Kenya). Lineament Extraction Using Gravity Data in Olkaria Geothermal Field, Kenya.

SUB-THEME	BUSINESS AND ECONOMIC TRANSFORMATION
Chairperson	Dr. David Kabata
Rapporteur	Ms. Winnie Wacera

1. **Koech, A.** (Umma University, Kenya). Financial Inclusion and Stock Market Development in Kenya.
2. **Gor, J. O.** (Daystar University, Kenya). Integrating Local Perspectives and Technological Innovations for Sustainable Development in Marginalized Pastoralist Communities: Lessons from East Pokot.
3. **Kamau, J. K., Muchangi, D. J. Mutiso, A.** (Kirinyaga University, Kenya). Influence of Strategic Human Capital Practices on External Labour Mobility in Public Level Five Hospitals in Kenya.
4. **Waweru, G., Murithi, K.** (Kirinyaga University, Kenya). Interest Rates Volatility and Commercial Banks Profitability in Kenya.
5. **Mbusi, E.T.** (Kirinyaga University, Kenya). Influence of Commercial Banks' Weighted Interest Rate On Construction Industry Growth Rate in Kenya.

SUB-THEME	EDUCATION FOR SOCIETAL DEVELOPMENT- PANEL A
Chairperson	Dr. Justus Muuasya
Rapporteur	Ms. Diana Boro

1. **Muiru, A.** (Kirinyaga University, Kenya). A Critical Analysis of Gender Differences in Suicide Ideation and Attempts Among Secondary Students in Muranga County, Kenya.
2. **Ntabo, V. O., Ndung'u, C. W.** (Karatina University, Kenya). Exploring Endearing Metaphors Among Swahili Youths in Mombasa County, Kenya: Insights from Conceptual Mappings.
3. **Rodgers, C., Kipsemon, K.** (Daystar University, Kibabii University, Kenya). Redefining Parental Involvement in Competency Based Curriculum Implementation in Kenya. A Critical Review.

4. **Obondo, G. Nabwire, V.** (Egerton University, Open University of Kenya, Kenya). Level of Competence on Digital Literacy Skills in Junior Secondary Schools, Kenya.

SUB-THEME	EDUCATION FOR SOCIETAL DEVELOPMENT- PANEL B
Chairperson	Dr. Violet Barasa
Rapporteur	Ms. Collins Musyoka

1. **Zainabu, O., Millan, O. L., Omolo, H. O.** (Rongo University, Kenya). Influence of Usability Skills of Smartphones on the Psychological Well-Being of University Students at Rongo University, Kenya.
2. **Irungu, D.** (Chuo Kikuu Cha Kirinyaga, Kenya). Athari ya Ubinafishaji wa Mamlaka na Rasilmali za Umma kwa Watawaliwa Katika Riwaya ya *Mbio Za Sakafuni*.
3. **Muusya, J. K.** (Kirinyaga University, Kenya). Fasihi ya Kiswahili kama Kichocheo cha Uhamasishaji wa Gen Z Kuhusu Mapinduzi Nchini Kenya.
4. **Nason, V.** (St. Paul's University, Kenya). Mapping the Impact of Lifelong Learning Skills and Transformation of the World of Work for the Chiefs Working in Machakos County, Kenya.

SUB-THEME	INFORMATION & KNOWLEDGE MANAGEMENT
Chairperson	Dr. Stephen Mageto
Rapporteur	Mr. Stephen Aidah

1. **Waswa, E., Sitati, S.** (Kibabii University, Kenya). Influence of Knowledge Management on Innovation and Competitiveness in Higher Learning Institutions in Kenya.
2. **Wasike, J. M., Kimote, Z.** (Kirinyaga University, Kenya). Infopreneurship in Kenya: Perceptions, Challenges, and Opportunities in the Digital Economy.
3. **Sisa, R. W.** (Kirinyaga University, Kenya). Sustainable Knowledge Management Practices: User Experience for Innovation and Agility.
4. **Kimote Z. K¹, Mutunga, D²,** (¹Kirinyaga University, ²Daystar University,

Kenya). An Assessment of the Contribution of Innovative Culture and Knowledge Management in the Attainment of Environmental Sustainability.

MID MORNING SESSION

11.00PM - 1.00PM

PARALLEL SESSIONS/ PLENARY

SUB-THEME	ICT AND DIGITAL TRANSFORMATION
Chairperson	Dr. Catherine Mukunga
Rapporteur	Mr. Stephen Kahungura

1. **Ndung'u, H., Mjeni, T. S.** (Kirinyaga University, Kenya). Artificial Intelligence for Sustainable Agriculture: Enhancing Crop Productivity Through Machine Learning in Kenya.
2. **Njogu, E.W., Chepchirchir, S., Ndegwa, H.** (Karatina University, Kenya). Utilizing Digital Technologies to Enhance Information Access for Lifelong Learning in Public Libraries in Nyeri County, Kenya.
3. **Maina, P. K, Masinza, F., Koech, R., Matasio, J.** (Kirinyaga University, Kenya). Perspectives of Librarians on Awareness and Readiness on Integration of Artificial Intelligence for Library Operations and Services in Selected University Libraries in Kenya.

SUB-THEME	HEALTH MANAGEMENT
Chairperson	Dr. Samuel Mburu
Rapporteur	Ms. Angela Alwora

1. **Mwangi, L. , Karenga, S., Mwangi, J. & Manwa, T.** (Mount Kenya University, Kenya). Effect of Type of Crime Scene on Latent Fingerprint Processing in Criminal Investigations in Kenya.
2. **Wangai L. N., Njoroje, W., Kimani, K., Kamau, L., Wairimu, B.M., Kimatu, J. N.** (Kirinyaga University, South Eastern Kenya University, Kenya). The Link Between Pesticide Use and Rising Cancer Cases in Kenya: Evidence, Challenges, and the Need for Comprehensive Research and Policy Interventions.
3. **Mwangi J.H., Mtshali N.G., Mbeje P.N.**(University of KwaZulu-Natal, South Africa).Challenges and opportunities of male partner involvement in cervical cancer prevention and control in Kenya: A qualitative analysis.

4. **Kimote, J. K². Kimote, Z²., Wasike, J. M².** (¹AIC Health Ministries, ²Kirinyaga University, Kenya). Revolutionizing Healthcare: The Role of Digital Health in Healthcare Service Delivery

SUB-THEME	MATHEMATICS
Chairperson	Dr. Josephine Ngure
Rapporteur	Mr. Urbanus Ndambuki

1. **Ongili P., Lao H. M.** (Kirinyaga University, Kenya). On Counting the Number of Cyclic Codes of Length n Over Prime Fields
2. **Kyalo, S.K., Kinyili, M., Kitavi, D. M., Mburu, Z. M., Mutua, G. K.**(University of Embu, Kenya). Assessing the Role of Post-Secondary Education Level on Unemployment Menace in Kenya: A Mathematical Modeling Approach.
3. **Ndichu, F. T., Kimani, P. M.** (Jomo Kenyatta University of Agriculture and Technology, University of Embu, Kenya). Transitivity, Primitivity, Rank and Subdegrees of $GL(3, q)$ On Non Zero Vectors Over Fq .
4. **Chege C.K., Kithinji M.M., Gachoki P.K.** (Kirinyaga University, Kenya) Modelling Volatility of Multivariate Time Series Using Var-Lstm-Garch Hybrid Model.

SUB-THEME	NATURAL AND PHYSICAL SCIENCES
Chairperson	Dr. Margaret Kariuki
Rapporteur	Ms. Ndirangu Faith

1. **Ouma, D.** (Kaimosi Friends University, Kenya). Human Induced Climate Change: Capturing it Right Using AI.
2. **Muita, E.** (Murang'a University of Technology, Kenya). Phenolic Ecotoxins in River Water: Survey on Knowledge and Practices of Road-Side Food Vendors Operating Along River Chania Bank Fringes in Thika Sub-County, Kenya.

SUB-THEME	BUSINESS AND ECONOMIC TRANSFORMATION
Chairperson	Dr. Robert Gitau
Rapporteur	Ms. Winnie Wacera

1. **Kamau, J. K., Muchangi, D. J., Mutiso, A.** (Kirinyaga University, Kenya). Moderating Effect of Perceived Organizational Support on the Influence of Strategic Health and Safety Practices on External Labour Mobility in Public Level Five Hospitals in Kenya.
2. **Njoroge, D.I, Kamau, S., Thumbi, A. W.** (Kirinyaga University, Kenya). Influence of Knowledge Acquisition on Human Resource Planning in the Public Service Commission of Kenya.
3. **Kagwi, J.** (Kirinyaga University, Kenya). Strategic Work-Life Balance and External Labor Mobility in Public Level Five Hospitals in Kenya.
4. **Mwangi, P.** (Kirinyaga University, Kenya). Financial Innovations and Sustainability of Commercial Banks in Kenya.

SUB-THEME	EDUCATION FOR SOCIETAL DEVELOPMENT- PANEL A
Chairperson	Dr. Bernard Chemwei
Rapporteur	Ms Millicent Machwenu

1. **Kipsonei, K.S., Lubanga, H.,** (Kibabii University, Kenya). The Integration of Edtech and Digital Learning in Curriculum Implementation in Public Low Cost Boarding Primary Schools in Turkana County.
2. **Kimote, J. K¹, Kimote, Z.², W asike, J. M².** (¹AIC Health Ministries, ²Kirinyaga University, Kenya). The Adaptability of Problem-Based Learning (PBL) Approaches in Kenyan Universities in the Preparedness of Competency-Based Curriculum(CBC) in Kenya.
3. **Kagendo, J. F.** (Kirinyaga University, Kenya). Effects of Population Growth on Urban Infrastructure and Services: A Case of Nakuru City, Kenya.

SUB-THEME	EDUCATION FOR SOCIETAL DEVELOPMENT- PANEL B
Chairperson	Dr. Daniel Lagat
Rapporteur	Ms Joyce Mugo

1. **Maina, S.** (Kirinyaga University, Kenya). An Investigation into the Challenges Faced by Students with Disabilities in Accessing Lectures at Kirinyaga University: Implications for Inclusive Education.
2. **Maina, S.** (Kirinyaga University, Kenya). An Investigation of the Contribution of Public University Libraries to Quality Education Through Digital Inclusion in Kenya.
3. **Ojwang C. W.** (Syracuse University, New York, USA). Prospective Teacher Educator Professional Development Through Creation of Multimedia Case Studies.

SUB-THEME	INFORMATION & KNOWLEDGE MANAGEMENT
Chairperson	Dr. Sophia Njeru
Rapporteur	Ms. Diana Boro

1. **Cheruiyot, E., Matasio, J. F.** (Kabarak University¹, Kenya Revenue Authority², Kenya). Sustainable Reference Services and User Experience for Creativity and Adaptability.
2. **Waweru, C. W.** (Kirinyaga University, Kenya). Leveraging Sustainable Knowledge Management Practices and User Experiences to Enhance Innovation and Agility in Poultry Farming in Kenya.
3. **Kamanda, B., Tsenga, S. M.** (Kirinyaga University, Kenya). Adoption of Resource Description and Access (RDA) Standards in Selected University Libraries in Kenya.
4. **Ubaga, E. M.¹ , Gichohi, P.M.², Mwai, J.M.³** (¹Daystar University, ²Kenya Methodist University, ³Kirinyaga University, Kenya). AI-Driven Information Services: Are Kenyan University Libraries Ready?

AFTERNOON SESSION

2:00 PM -3.30 PM

PARALLEL SESSIONS/ PLENARY

SUB-THEME	ICT AND DIGITAL TRANSFORMATION
Chairperson	Dr. Victor Mageto
Rapporteur	Mr. Stephen Kahungura

1. **Njeri, P.** (Kirinyaga University, Kenya). Exploring The Role of University Libraries in Digital Preservation Advocacy: A Case Study of Selected Kenyan Institutions.
2. **Wayua, M. V.** (Kirinyaga University, Kenya). Role of Librarians in Guiding Users Through AI-Powered Tools and Resources.
3. **Muchangi D.M.** (University of Embu, Kenya). Implications of Generative Artificial Intelligence on Higher Education in Kenya

SUB-THEME	HEALTH MANAGEMENT
Chairperson	Dr. Immaculate Marwa
Rapporteur	Mr. Brian Murigi

1. **Wairimu, B. M., Mburu, S., Munde, E. O.** (Kirinyaga University, Kenya). Adherence to Comprehensive Newborn Care Protocol by Healthcare Providers and its Association with Growth Outcomes
2. **Ondiki Marwa I.** (Kirinyaga University, Kenya). Contributing Factors of Tuberculosis Infection Among Adult Men in Mwea-West, Kirinyaga County.
3. **Murigi M.** (Virginia Commonwealth University, USA). An integrative Review of Literature on the Sustainability of Artificial Intelligence in Nursing Education: A Global Perspective.
4. **Asiko, L., Kamathi,P. & Muchiri, M.** (Karatina University, Kenya). The Double Burden of Malnutrition and Dietary Diversity among Female Tea Pickers in Kenya and Implications to Household Nutrition Security.

SUB-THEME	BUSINESS AND ECONOMIC TRANSFORMATION
Chairperson	Dr. Evelyne Maina
Rapporteur	Mr Simon Gacheru

1. **Mbaka, N.** (Karatina University, Kenya). Role of Cultural Expression, Collaborative Innovation, and Technological Integration in Achieving Sustainable Design for Affordable Housing in Nairobi County, Kenya.
2. **Maina, M., Kabata, D. & Muriithi C.** (Kirinyaga University, Kenya). Environmental Activities and Performance of Listed Commercial Banks in Kenya.
3. **Mwangi, G., Muigai, R.G.** (Kirinyaga University, Kenya). A Review of Empirical Literature on Creative Accounting.

SUB-THEME	EDUCATION FOR SOCIETAL DEVELOPMENT
Chairperson	Dr. Nene Nderitu
Rapporteur	Mr. Simon Cheptum

1. **Muiru, A.** (Kirinyaga University, Kenya). Personality and Psychopathology on Academic Achievement of University Students in Kenya.
2. **Nyamundundu, A. V¹, Biningu, H².** (¹TTC Gacuba II, ²TTC Zaza, Rwanda). Educational Technology is Not a Luxury in The 21st Century, it is a Necessity.
3. **Kerubo, J.** (Kirinyaga University, Kenya). The Effect of the Use of ChatGPT On Teaching and Learning in Universities in Kenya.

SUB-THEME	INFORMATION & KNOWLEDGE MANAGEMENT
Chairperson	Dr. Rachel Nyang'inja
Rapporteur	Mr. Bonface Kamau

1. **Kiplagat, S., Njuguna, A.** (Kirinyaga University, Kenya). Digital Literacy for Knowledge Management at Egerton University Library: Assessing Initiatives for Enhancing Access and Utilization of Digital Resources.

2. **Tsenga, S. M., Gichohi, P. M.** (Kenya Methodist University, Kenya). Empathy of Digital Institutional Repository Service Provision at Selected Universities in Meru County.
3. **Ubaga, E. M¹ , Gichohi, P.M² ,** (¹Daystar University, ²Kenya Methodist University, Kenya).

END OF THE CONFERENCE, 2025

ABSTRACTS

SUBTHEME: ENGINEERING AND TECHNOLOGY

DEEP LENS: SOLAR-POWERED OFFLINE DIGITAL LEARNING PLATFORM

¹Muchira I., ²Mwaniki I.C.

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Abstract

Millions of students living in poor districts are prevented from learning due to absence of electricity and connectivity to the internet. UNESCO (2022) reported that 63% of school-age children lack home internet, widening the digital divide. Although ICT improves learning low-cost offline solutions are lacking. Deep Lens is an offline, solar-powered digital learning center providing hassle-free access to quality education for communities in off-grid areas. It employs renewable energy, local networking, and AI-powered tutoring to bridge the education gap, helping achieve UN Sustainable Development Goal 4. While using Raspberry Pi microservers and Wi-Fi mesh networking, Deep Lens provides a local intranet for students to access preloaded educational content – videos, e-books, and interactive lessons. Being solar-powered and internet-free, it supports multiple users. With internet connection, it synchronizes progress and refreshes content. Previous reports of implementation have shown 65% enhancement in content access and 40% enhancement in learning retention. Users reported seamless offline learning and ease of employment. Content updates operated seamlessly on availability of internet. Deep Lens is an affordable, high-impact, scalable digital learning platform. It employs solar energy, localized networking, and AI-driven personalization to deliver equal access to education and can support learning in rural schools, refugee camps, and crisis zones.

Keywords: *Deep lens, solar-powered, offline digital learning platform.*

CONSTRUCTION INDUSTRY OUTPUT GROWTH RATE RESPONSE TO INFLATION RATE IN KENYA

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Abstract

Construction industry is a key sector in a nation's economy, and therefore, understanding the effects of inflation on this industry can enable policymakers to ensure its stable growth and contribution to Kenya's Gross Domestic Product (GDP). This study presents empirical findings on the impact of inflation rate (IR) on construction output growth rate (COGR) and its implications for policy formulation. A time series data analysis approach was employed, using data from the Kenya National Bureau of Statistics and the Central Bank of Kenya, covering a 47-year period (1977–2023). Data analysis was conducted using EViews version 10, incorporating graphical analysis, correlation analysed, stationarity tests, and regression analysis. Construction output growth rate (dependent variable) was regressed against the inflation rate (independent variable) using second-difference transformations. Results showed that IR had no immediate significant impact on the growth of Kenya's construction industry, as indicated by a coefficient of determination (R^2) of 0.000043. However, a lagged regression model demonstrated a stronger explanatory power, with an R^2 value of 0.594232, suggesting that inflation influences construction output growth with a time lag. These findings highlight the delayed effects of inflation on the industry and provide insights for economic and policy interventions.

Keywords: *Construction output, time series, stationarity, explanatory power.*

STUDY OF MECHANICAL DEFORMATION OF A ZR-CU BASED BMG: EXPERIMENTS AND NUMERICAL STUDIES

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Abstract

Bulk metallic glasses (BMGs) have garnered significant interest due to their unique mechanical properties, including high strength, hardness, and excellent wear resistance. However, their limited plasticity under mechanical loading poses challenges for structural applications. This study investigates the mechanical deformation behavior of a Zr-Cu-based BMG through both experimental and numerical approaches. Compression tests were conducted to evaluate the stress-strain response, failure modes, and deformation characteristics of the alloy. Scanning electron microscopy (SEM) was used to analyze the fracture surfaces and identify shear band formation mechanisms. A finite element model (FEM) was developed to simulate the mechanical response of the BMG, incorporating appropriate constitutive laws to capture its inhomogeneous plastic deformation. The numerical results were validated against experimental findings, showing good agreement in stress distribution and failure predictions. The study highlights the influence of strain rate, temperature, and microstructural factors on deformation behavior. The findings contribute to a better understanding of the mechanical performance of Zr-Cu-based BMGs and provide insights into their potential engineering applications. The combined experimental and numerical approach offers a comprehensive framework for optimizing BMGs for advanced structural and functional applications.

Keywords: *Bulk metallic glass, Zr-Cu-based BMG, mechanical deformation, finite element modeling, shear banding.*

SUBTHEME: HEALTH MANAGEMENT**DETERMINANTS OF ZINC UTILIZATION IN THE MANAGEMENT OF
DIARRHEAL DISEASES AMONG UNDER-FIVE CHILDREN IN KIRINYAGA
COUNTY**

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For many years, zinc has been used to treat diarrhea yet diarrhea continues to be a major cause of morbidity and mortality among young children, particularly in developing nations. Although zinc supplementation is known to help manage diarrhea, many obstacles prevent it from being widely used. The WHO and UNICEF recommend that any child with diarrhea signs be given zinc tablets as part of the treatment within 24 hours for not less than 10 days. This study aims to explore what influences the use of zinc for managing diarrhea in children under five in Kirinyaga County. The study was sought to determine how zinc is currently used in treating diarrhea, identify the factors that affect zinc use in this context and evaluate how the current use of zinc relates to health outcomes. A cross sectional analytical design was employed focusing on healthcare and caregivers of children under five years who have received treatment for diarrhea in the previous two weeks. 255 participants were sampled comprising 230 mothers of children treated for diarrhea and 25 healthcare workers, determined using the Yamma Formula. Purposive sampling was used for healthcare workers and random sampling for caregivers. Questionnaire was used to collect data from three-level four hospitals and one county referral hospital. Data was coded and analyzed using IBM SPSS version 25.0. Of 230 participants, only 67(29.1%) of children who experienced diarrhea received zinc combined with other treatments during the diarrhea episode. However, mothers with a secondary or higher level of education 92 of 260 had a 40% higher likelihood of zinc utilization during childhood diarrhea (AOR, 1.40; 95% CI 1.05 to 2.22). 42% of those who returned to hospital with a severe form of diarrhea did not give zinc. 3 of the 4 (80%) examined healthcare facilities had experienced a stock out of zinc in the last 6 months. Of the 25 healthcare workers, none (100%) had been sensitized on the benefits of zinc use for more than 6 months. Of the 4 hospitals, none (100%) had received supportive supervision on zinc utilization. Prevalence of zinc use among under-five children with diarrhea in Kirinyaga was low. There was no monitoring mechanism in the healthcare system to ensure that healthcare workers gave zinc to all children with diarrhea. There is need for County healthcare to adopt appropriate strategies to improve zinc utilization are needed.

Keywords: *Zinc utilization, management, diarrheal diseases, under-five children, Kirinyaga County.*

FUNCTIONAL SEXUAL OFFENSES' ANALYSIS INFRASTRUCTURE: ITS IMPACT IN SHAPING OUTCOMES OF SEXUAL OFFENSES' FORENSIC INVESTIGATION IN BUTERE SUB-COUNTY, KAKAMEGA COUNTY, KENYA.

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Abstract

Addressing the plight of sexual assault victims and survivors remains a daunting challenge for the criminal justice system. In Kenya, it is estimated that only a quarter of sexual offense cases presented in court lead to successful convictions. This issue arises at every stage, from apprehending offenders to gathering and analyzing forensic evidence. Actual evidence to be collected is contingent upon the capacity to analyse, preserve, and use it. The primary focus of this study was to assess the influence of functional sexual offenses' analysis infrastructure on the outcome of sexual offenses' forensic investigation in Butere sub-county of Kakamega County, Kenya. The study explored technical expertise, forensic laboratory and Standard Sexual assault examination kit. The significance of the study is to give insight into the successful investigation of sexual offenses and guide policy formulation regarding investigation of sexual offenses. The study adopted a descriptive survey design to provide an explanation of the variables and an explanatory research design to explain causal links between variables. Stratified random sampling was used to select police respondents from police stations and police posts from Butere Sub County and snowball and purposive sampling was used to select survivors of sexual assault offences within Butere sub county and health workers from level 4 hospitals in Butere Sub County respectively. Data was collected using closed and open-ended questionnaires administered to police officers, interview guides administered to healthcare workers and survivors of sexual assault offenses. Data was subjected to thorough editing and summarized before analysis. Qualitative data was analysed thematically with the help of NVivo software while Quantitative data was analysed using Statistical Package for Social Sciences (SPSS) version 24 and results presented using tables. There was inadequate sexual assault investigating infrastructure within the Sub-County lacking a single functional laboratory (composite mean=2.70). Results also showed that sexual examination kit was only available in district hospitals and notably, knowledge of its utilization was low. The coefficient of correlation was found to be ($R = 0.701$) and coefficient of determination was ($R^2 = 0.491$). There is need for periodical training to law enforcement agencies and health workers on sexual evidence and construction of an operational fully equipped forensic laboratory within Kakamega County.

Keywords: *Sexual offenses' analysis infrastructure, forensic investigation.*

THE LINK BETWEEN PESTICIDE USE AND RISING CANCER CASES IN KENYA: EVIDENCE, CHALLENGES, AND THE NEED FOR COMPREHENSIVE RESEARCH AND POLICY INTERVENTIONS

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Abstract

Use of pesticides in Kenya's agricultural sector has raised significant concerns about their potential role in increasing cancer incidences. Pesticides often contain carcinogenic chemicals, such as organophosphates, organochlorines, and glyphosate, which can disrupt cellular hormonal processes, damage DNA, and promote tumor growth. Occupational exposure among farmers and agricultural workers, environmental contamination of food and water, and improper pesticide use are exacerbating these risks. There are global evidences linking certain pesticides to cancers like non-Hodgkin lymphoma, leukemia, and breast cancer. However, direct evidences in Kenya remains limited due to a lack of comprehensive studies. Local research has identified pesticide residues in food, water, and soil, with some studies revealing concentrations above acceptable limits. Organochlorine pesticides have for instance been detected in breast milk samples, indicating long-term exposure among Kenyan women. Additionally, regions with intensive agricultural activities, such as the Rift Valley and Mount Kenya regions, report higher cancer cases, suggesting a possible correlation with pesticide use. However, challenges such as underreporting of cancer cases, misdiagnosis, and the multifactorial nature of cancer complicate efforts to establish a direct link. To address these gaps, this study was instituted to investigate the relationship between pesticide exposure and cancer in Kenya. It included biomonitoring of pesticide residues in human tissues, environmental sampling, and epidemiological surveys to assess exposure levels and cancer prevalence. The results showed glyphosate and DDT with a correlation value of $r = 0.75$, Chi square (χ^2) of 4.8125 and a $p < 0.028$. This showed that the pesticides often appeared together in the samples. Phthalates and molluscicides had correlation value ($r = -0.40$), χ^2 value of 12.2203 and $p < 0.002$ which is highly significant. This indicated that molluscicides are used in places where phthalates were less common. Studies have linked phthalate exposure to breast cancer, testicular cancer, and liver cancer due to their ability to mimic estrogen and disrupt normal cell growth. The research recommends, strengthening of regulatory frameworks, promotion of safer alternatives, and raising public awareness about the risks of pesticide misuse. Notably, Kenya can mitigate the potential health risks posed by pesticides and safeguard public health by integrating scientific research with policy interventions.

Keywords: *Agrovets, cancer, herbicides, residues, carcinogens, agriculture.*

DEVELOPMENT OF AN AFFORDABLE AND EFFICIENT PHASE-LOCKED MAGNETO-OPTICAL MALARIA DIAGNOSTIC SYSTEM FOR PRECISE AND RELIABLE DETECTION

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Abstract

Malaria remains a major global health challenge, necessitating development of more effective, affordable, and accessible diagnostic strategies. Current detection techniques, though widely used, often suffer from high costs, reliance on skilled personnel, low sensitivity, and time-intensive procedures. These limitations hinder early and accurate malaria diagnosis, increasing the risk of severe complications and transmission. We present a novel phase-locked malaria diagnostic system that leverages the magneto-optical properties of hemozoin—a biomarker produced by malaria parasites. The system integrates a laser beam and a rotating magnetic field, generated by an AC motor, to induce and detect hemozoin crystal interactions. The phase-locking mechanism ensures precise synchronization between the AC motor and the monochrome camera, significantly enhancing sensitivity and specificity in hemozoin detection. A feedback control loop stabilizes the AC motor's speed, maintaining a consistent rotating magnetic field that influences the hemozoin crystals' optical properties. As the field interacts with the crystals, their magneto-optical response is dynamically altered and a highly sensitive optical sensor captures these changes in real-time, allowing for accurate malaria detection. This cost effective and easy to implement approach improves reliability and efficiency of malaria diagnostics while remaining cost-effective and easy to implement. By eliminating the need for expensive reagents and highly trained personnel, this system presents a promising alternative for resource-limited settings. Results suggest that phase-locked magneto-optical detection could be a transformative technology in the fight against malaria, offering a rapid, precise, and scalable diagnostic solution.

Keywords: *Malaria, hemozoin, phase-locking, magneto-optics.*

A NOVEL MODEL FOR TRANSMISSION DYNAMICS OF MENINGITIS INCORPORATING VACCINATION AND TREATMENT USING COUNTERFEIT AND NON-COUNTERFEIT DRUGS

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Abstract

The protective membranes around the brain and spinal cord become inflamed or swollen when meningitis occurs. The original mode of transmission for bacterial meningitis was from animal to human, but has not been confirmed to spread from person to person through contaminated surfaces, saliva, respiratory secretions, and aerosol droplets. This study analyses bacterial meningitis using counterfeit and non-counterfeit drugs. Numerous mathematical representations regarding bacterial meningitis transmission have been put up and examined. The study investigated the effect of administering counterfeit and non-counterfeit medication to infected individuals. According to the model analysis, endemic equilibrium is only locally asymptotically stable when the basic reproduction number is smaller than unity, while the disease-free equilibrium is asymptotically stable both locally and globally. Administering counterfeit drugs to infected individuals may lead to no recovery. Weaker regulatory controls may lead to unsuitable outcomes. MATLAB software is utilized to do numerical simulations that illustrate the influence of counterfeit and non-counterfeit drugs resulting to severe illness on areas prone to counterfeit drugs. There is need for a coordinated effort among governments, healthcare providers, pharmaceutical companies, and the public to ensure optimal results.

Keywords: *Bacterial meningitis, counterfeit drugs, non-counterfeit drugs, vaccination, exposed.*

ASSESSMENT OF FACTORS INFLUENCING CONTINUOUS PROFESSIONAL DEVELOPMENT EFFECTIVENESS IN CLINICAL PRACTICE AMONG NURSES AND MIDWIVES IN MERU COUNTY - KENYA

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Abstract

Globally, among the top five causes of maternal mortality in women, the leading is hemorrhage. In Sub-Saharan Africa, the need for nurses and midwives is apparently increasing due to a deficit of capabilities, with only 3.5% of the world's healthcare staff managing 27% of the disease burden, hence poor participation in CPD activities. The aim of the study was to assess the factors influencing effectiveness of CPD in clinical practice for nurses and midwives in Meru County. This study will highlight the gaps faced in achieving optimal CPD, and advises strategies to improving its effectiveness. The study used qualitative and quantitative techniques, adopting RCT design in three phases, among 78 sampled nurses and midwives. In phase one, data was collected using questionnaires, interview schedule checklists and case studies. Quantitative data was analyzed using SPSS version 26 while qualitative data was analyzed thematically. Pearson's chi square test was used to test the relationship between knowledge and CPD uptake in clinical practice. Paired t-test compared means within the control and intervention groups. Results demonstrated gaps in midwifery clinical competencies. Despite the provision and use of BEmONC guidelines, there's need for ongoing trainings to standardize practices. Generally, a good understanding on skills competencies was depicted, though with major gaps observed in progressive management of third phase of labor and in completion of the partograph. Strategies to bridge quality gaps, through relevant personnel and tailoring skills-based specific courses should be considered.

Keywords: *Continuous professional development (CPD).*

AWARENESS OF POSTPARTUM DEPRESSION RISK FACTORS AMONG POST-NATAL MOTHERS IN NYERI COUNTY AND REFERRAL HOSPITAL - KENYA

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Abstract

Postpartum depression is among the mental illnesses that affect a mother during the postpartum period, with an increasing incidence rate from 13% to 15% in 2016 and 2019 respectively. Awareness of risk factors to postpartum depression among mothers is fundamental in its management, determining willingness to seek medical attention. The purpose of this study was to determine the awareness of risk factors for postpartum depression among mothers admitted in postnatal ward in Nyeri County Referral Hospital. The study utilized a descriptive cross-sectional design. The target population was postnatal mothers admitted in the postnatal ward, with a calculated sample size of 30 mothers. Simple random sampling method was used to sample participants. Data was collected using questionnaires which was pretested at Meru General Hospital and analyzed using SPSS version 26. Descriptive analysis was used to obtain frequencies and percentages. Results showed that majority (47%) were not knowledgeable about postpartum depression and its causes. Many respondents (86.7%) admitted to have had unplanned pregnancies and having experienced confusion and anxiety (16.7%). Results of this study will advise policy implementation and potentially increasing patient outcomes at Nyeri County Referral Hospital. There is need for health care providers to educate mothers on postpartum depression.

Keywords: *Postpartum depression, awareness, risk factors, knowledge, attitude.*

INTERPERSONAL COMMUNICATION (IPC) STYLES IN DOCTOR-PATIENT INTERACTION ASSOCIATED WITH PATIENT SATISFACTION AND ADHERENCE AT THE COAST GENERAL HOSPITAL (CGH).

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Abstract

The purpose of this study was to explore the interpersonal communication (IPC) styles in doctor-patient interaction associated with patient satisfaction and adherence at the Coast General Hospital (CGH). Mental health and well-being is significant to the overall health of a patient. Despite the fact that patients have today become more autonomous, IPC styles remains the primary means by which the doctor and patient exchange health information. This study sought to identify IPC styles that emerge from doctor-patient interaction at CGH the IPC styles preferred by patients at CGH and to establish association between doctor-patient IPC styles and patient satisfaction and adherence at the Hospital. Social Interaction Theory and The Four Habits Model formed the theoretical basis of this study to evaluate doctor patient IPC styles from two perspectives: The Study adopted an exploratory survey design. Thirty-one (31) doctors and two hundred and twelve (212) patients participated in the study. A pilot study of 10% of the target population was conducted to establish the validity and reliability of the data collection instrument. Both doctors and patients were issued with questionnaires consisting of closed-ended questions. Doctors who were respondents, were issued with questionnaires in their respective offices during working hours. On the other hand, patients were issued with questionnaires in the lounges and in the hospital canteen. Quantitative data was coded then keyed into Statistical Package for Social Science (SPSS) software analysed and data presented using tables and graphs. Descriptive data analysis was carried out and presented. Results showed that patients generally preferred affiliation style of IPC. This was because the patients wanted more of a chance to elaborate their state of health to the practitioners, as well as to understand more regarding their health conditions. Results confirmed that doctor's IPC styles determined, to a large extent, patient satisfaction and adherence with medical care received. Satisfaction with physician communication was strongly correlated with patient satisfaction with care. There is need for IPC styles to be optimized by healthcare providers and administrators in public hospitals.

Keywords: *Interpersonal communication (IPC) styles, satisfaction, adherence.*

ADHERENCE TO COMPREHENSIVE NEWBORN CARE PROTOCOL BY HEALTHCARE PROVIDERS AND ITS ASSOCIATION WITH GROWTH OUTCOMES IN PRETERM INFANTS

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Abstract

Preterm birth, defined as delivery before 37 weeks of gestation, remains a major public health concern, particularly in low- and middle-income countries (LMICs) such as Kenya. Despite advancements in neonatal care, adherence to Comprehensive Newborn Care Protocols (CNCs) remains inconsistent, affecting growth outcomes in preterm infants. This study assessed healthcare providers' adherence to CNCs at Muranga County Referral Hospital and its association with preterm infant growth outcomes. A cross-sectional descriptive design was employed, using structured questionnaires to collect data from healthcare providers on adherence to CNCs. Quantitative analysis was conducted using descriptive and inferential statistics in SPSS. Results showed moderate adherence to CNCs, with variations across key indicators: feeding fluids (Mean = 3.23, SD = 0.82), breastfeeding support (Mean = 3.24, SD = 1.09), and weight gain monitoring (Mean = 3.23, SD = 0.69). Determinants such as knowledge and competency (Mean = 3.2, SD = 0.89), beliefs and attitudes (Mean = 3.15, SD = 1.12), and years of experience (Mean = 3.16, SD = 0.65) significantly influenced adherence. Growth outcomes, measured by weight gain information, were positively correlated with adherence levels (Mean = 3.24, SD = 0.56), indicating that improved compliance with CNCs enhances preterm infant growth. The study highlights gaps in adherence to CNCs and underscores the need for targeted interventions, such as continuous training, attitude transformation programs, and improved resource allocation, to optimize neonatal care and improve preterm infant growth outcomes. These results provide valuable insights for policymakers and healthcare practitioners in LMICs focused on enhancing neonatal survival and development.

Keywords: *Preterm infants, adherence, comprehensive newborn care protocols, neonatal care, growth outcomes*

CONTRIBUTING FACTORS OF TUBERCULOSIS INFECTION AMONG ADULT MEN IN MWEA-WEST, KIRINYAGA COUNTY

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Abstract

Tuberculosis (TB) remains a significant global health challenge with a disproportionate burden on adult men. It is the second leading global mortality cause with a larger proportion of adult male cases. The study's main objective was to determine the contributing factors of tuberculosis infection among adult men in Mwea-west, Kirinyaga County. A descriptive survey of 25 Pulmonary Tuberculosis patients was carried out at Mutithi health center in Mwea-west. Quantitative methods were employed in data collection using structured questionnaires administered to 25 sampled adult male TB patients. Data was analysed using Microsoft Excel employing both descriptive and inferential statistics at a Z-score of 1.96, confidence level of 0.95 and a statistical significance set at 0.05. Analysis was done using frequencies, percentages and presented in tables and charts. The study established that socioeconomic factors contributed to the robust TB cases among adult men by determining their capability to counter the disease. Behavioural practices were also key in contributing to the high TB cases among adult men. The study further established that comorbidities and Health Seeking Behaviour had more weight in contributing to TB among adult men. It was concluded that socioeconomic factors, Behavioural factors and comorbidities and Health Seeking Behaviour significantly contributed to TB among adult men in Mwea-west, Kirinyaga County. There is need to establish uninterrupted programs at the county level focused on improving men's socioeconomic status. There should be infrastructural investment in public health facilities and fostered partnership with the private health facilities for quality healthcare delivery. There should also be coordination with Non-Governmental Organizations (NGOs) to conduct health promotion services, health education on TB and TB anti-stigma campaigns. Furthermore, regular TB surveillance should be conducted and reports disseminated for action to be taken alongside capacity-building of local healthcare workers.

Keywords: *Tuberculosis infection, adult men.*

MATERNAL AND CHILD WELFARE AMONG STUDENT-MOTHERS AT CHUKA UNIVERSITY: A SURVEY REPORT

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Abstract

This study investigated the challenges and needs of student-mothers at Chuka University, with a particular focus on maternal and child welfare, as well as on-campus childcare facilities. A comprehensive survey was administered using the Kobo Collect tool, gathering demographic information, challenges faced by student-mothers, and insights into childcare arrangements. The findings highlight the predominant age group of 20-24 years among student-mothers, along with variations in participation across different campuses. The study suggests a need for tailored support services for student-mothers, especially for younger students, and highlights gaps in childcare facilities at Chuka University.

Keywords: *Maternal and child welfare, student-mothers, Chuka University.*

AN INTEGRATIVE REVIEW OF LITERATURE ON THE SUSTAINABILITY OF ARTIFICIAL INTELLIGENCE IN NURSING EDUCATION; A GLOBAL PERSPECTIVE

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Abstract

Integration of Artificial Intelligence (AI) in healthcare management is progressing quickly and nursing education is uniquely positioned to benefit from AI. Thus, AI in nursing education is revolutionizing traditional teaching practices by providing individualized learning experiences, virtual simulations, and real-time assessments. Integrating AI is one thing however, AI sustainability presents several challenges that must be carefully considered and addressed to maximize its benefits and minimize its risks. An integrative literature review was guided by the PRISMA principles and focused on examining sustainability of AI in nursing education from a global perspective and with the view to exploring the long-term sustainability of AI driven educational tools in nursing, considering the disparities in access to technology, data privacy concerns, and the need for faculty and students training. Using PRISMA principles, 30 publications were reviewed and thematic content analyzed. Results showed that AI enhances nursing competencies, bridges educational gaps, and support evidence-based health care practice across diverse systems. Despite these benefits, several factors that could potentially hinder the sustainability of AI were identified among them faculty and learner readiness ethics and policy support. Thus, while AI has potential to revolutionize traditional nursing education, a balanced approach that ensures stakeholder inclusivity, ethical responsibility, and technological adaptability and policy support are essential for global sustainability.

Keywords: *Artificial intelligence, nursing education, sustainability, global perspective.*

DIGITAL UNITIES OF MALE PARTNER INVOLVEMENT IN CERVICAL CANCER PREVENTION AND CONTROL IN KENYA: A QUALITATIVE ANALYSIS

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Abstract

Background: Cervical cancer remains a significant public health concern globally, despite advancements in prevention and treatment. Male partner involvement in cervical cancer prevention is not merely a matter of personal responsibility but a critical component of a comprehensive public health strategy. It's imperative to find out what factors influence male partner's participation in cervical cancer prevention and control. The study aimed at establishing the challenges and opportunities of male male partner involvement in prevention and control of cervical cancer. A qualitative analytical, descriptive design was applied to collect data from a purposeful sample of 20 couples, 20 Nurses two clinical officers two gynecologists, five community health workers and three county directors of health. Thematic analysis was employed to identify recurring themes and patterns within the study. Results Challenges identified included knowledge deficit, lack of finances and logistic support, lack of moral support, time constraint, social norms and cultural beliefs, poor health facilities infrastructure and layout, stigma, and lack of community leadership. The opportunities identified were educational and awareness campaigns, shifting social norms and cultural beliefs, promotion of communication among couples, practical support from male partners, integration of services and role modeling. The study findings identified challenges and potential opportunities in male partner involvement during processes that helps in cervical cancer screening, treatment

Policy makers can incorporate the study findings in addressing barriers and take advantage of the opportunities that the study findings identified in cervical cancer prevention and control.

Keywords: *Digital unities, male partner, involvement, cervical cancer prevention and control, kenya, qualitative analysis*

THE DOUBLE BURDEN OF MALNUTRITION AND DIETARY DIVERSITY AMONG FEMALE TEA PICKERS IN KENYA AND IMPLICATIONS TO HOUSEHOLD NUTRITION SECURITY

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Abstract

Food and nutrition insecurity remains one of the greatest global burdens to achieving the sustainable development goals (SDGs) on zero hunger and good health (SDG 2 and 3). Impacts of malnutrition have serious consequences on women including higher risk of chronic diseases, decreased work capacity and increased maternal mortality. Despite the critical role women play in developing nations like Kenya in agricultural workforce, reports indicate that they are vulnerable to nutritional risks. Previous studies in different Kenya tea zone areas show that tea pickers in large-scale tea estates are underweight as well as overweight and obese. These women are exposed to labor intensive and long working hours at the tea farms without break offs or adequate time for preparation of nutritious meals. Consumption of cheap and unhealthy diet further predispose them to risks of reproductive health issues and non-communicable diseases. Such sub-optimal nutrition status result in decreased energy levels decreased productivity and diminished health. At household level, their families lack diet diversification that can promote balanced diet. A current ongoing cross-sectional study is assessing this "double burden" of malnutrition of female tea pickers at Ragati tea zone, Karatina in Nyeri County, with the aim of improving healthy dietary habits and food crops in the community. The baseline nutrition status will be determined using anthropometric measurements of Body Mass Index, while Minimum Dietary Diversity Score for Women (MDD-W) will be used to evaluate their dietary diversity consumption of at least five out of ten food groups. The findings of the study is expected to provide crucial insights that will guide in targeted dietary interventions, of improving nutrition status of the female tea pickers, with an upward positive ripple effect to their family and tea communities in terms of health and enhanced life productivity.

Keywords: *Tea zones, productivity, dietary diversity, nutrition status, female tea pickers.*

SUBTHEME: MATHEMATICS**ASSESSING THE ROLE OF POST-SECONDARY EDUCATION LEVEL ON UNEMPLOYMENT MENACE IN KENYA; A MATHEMATICAL MODELING APPROACH**

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G.M.

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Unemployment remains a major challenge in many developing countries in the world, including Kenya. It is worth noting that, youths' unemployment rate is high and mismatch of skills in the job market is phenomenal. This study develops a deterministic mathematical model to assess the role of post-secondary education on the unemployment problem in Kenya. We address our problem by formulating a model with seven time-dependent dynamic variables namely: pre-tertiary class, university class, vocational class, skilled class, semi-skilled class, unemployed class and employed class. We performed a thorough quantitative and qualitative analysis of the model. We compute the unemployment reproduction R_u , prove that the model has a unique unemployment free equilibrium (UFE) when $R_u < 1$ and admits a unique unemployment endemic equilibrium (UEE) whenever $R_u > 1$. The unique UFE and UEE are both locally and globally asymptotically stable whenever $R_u < 1$ and $R_u > 1$ respectively. Further, we validate the model by fitting it to real data of unemployed persons in Kenya in the year 1991 – 2023 as reported by the International Labour Organization (ILO). Numerical results indicate that, an increased individual's skills match to the job market demands, significantly decreases the number of unemployed persons and increases the number of employed individuals. Moreover, it is demonstrated that, increasing the rate of employment to the unemployed persons reduces the problem of unemployment substantially. This can be achieved by setting up more sectors for job opportunities.

Keywords: *Unemployment, reproduction number, post-secondary education, free equilibrium, endemic equilibrium, numerical simulation.*

TRANSITIVITY, PRIMITIVITY, RANK AND SUBDEGREES OF $GL(3, Q)$ ON NON ZERO VECTORS OVER FQ

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Abstract

The General Linear group has been analyzed by a number of researchers. Some of the properties such as transitivity, rank and subdegrees associated to the action of $GL(2, q)$ on non-zero vectors over $GF(q)$ have been determined. This study determines the transitivity, primitivity, rank and subdegrees associated with the action of $GL(3, q)$ on $F^3 \setminus \{0\}$ over F_q . Transitivity is determined using Orbit-Stabilizer Theorem while the primitivity using Maximal subgroup approach. The action is primitive where $q = 2$ and imprimitive where $q \geq 3$. Moreover, the suborbits are computed using the definition of an orbit i.e. $Orb_G(y) = \{gy \mid g \in G\}$ and thus analyzing on ranks and subdegrees. The rank is q and the subdegrees are as follows: $q - 1$ suborbits have length 1 while the remaining suborbit is of length $q^3 - q$. Results associated with the above properties are discussed and generalized either as lemmas or theorems.

Results and Discussion

Transitivity of $GL(3, q)$ on $F^3 \setminus \{0\}$

Lemma 1.1. Let $G = GL(3, q)$ act on $Y = F^3 \setminus \{0\}$. Then,

$$Stab_G \begin{pmatrix} a & b & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} d & e & 0 \\ 0 & 1 & 0 \\ g & h & 1 \end{pmatrix} : d \neq 0 \text{ and } a, b, d, e, g, h \in F_q$$

and $Stab_G \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix} = q^3(q^2 - 1)(q - 1)$.

Theorem 1.2. The group $G = GL(3, q)$ acts transitively on $Y = F^3 \setminus \{0\}$.

Primitivity of $GL(3, q)$ on $F^3 \setminus \{0\}$

Theorem 1.3. The group $G = GL(3, q)$ acts primitively on $F^3 \setminus \{0\}$ for $q = 2$.

Theorem 1.4. The group $G = GL(3, q)$ acts imprimitively on $F^3 \setminus \{0\}$ for $q \geq 3$.

Ranks and Subdegrees of $GL(3, q)$ on $F^3 \setminus \{0\}$

Theorem 1.5. Let $G = GL(3, q)$ act on $Y = F^3 \setminus \{0\}$. Then, the rank is q , where $q - 1$ suborbits are of length 1 and the remaining 1 suborbit is of length $q^3 - q$

Conclusion

In this paper, it has been determined that;

- (i) the action of $GL(3, q)$ on ${}_{q^3}F^3 \setminus \{0\}$ is transitive, (ii) that action of $GL(3, q)$ on $F^3 \setminus \{0\}$ is primitive, where $q = 2$ and imprimitive for $q \geq 3$ and that (iii) the action of $GL(3, q)$ on $F^3 \setminus \{0\}$ has q suborbits implying that the rank is q . In addition, $q - 1$ of those suborbits are of length 1 and the remaining suborbit is of length $q^3 - q$.

Keywords: *Transitivity, primitivity, rank and subdegrees of $GL(3, q)$, non zero vectors over F_q*

ACTION OF THE GROUP OF 2×2 INVERTIBLE DIAGONAL MATRICES WITH ENTRIES IN $GF(q)$ ON 2-DIMENSIONAL VECTOR SPACE OVER $GF(q)$

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Abstract

The ranks and subdegrees of S_n and D_n acting on ordered elements subsets and unordered r-elements subsets respectively have been researched by several mathematicians. Recently, the action of $GL(2, q)$ on non-zero vectors over $GF(q)$ has also been thoroughly worked on in relation to orbits, subdegrees and ranks. However, not much has been done on the action of $DL(2, q)$ on F_q^2 . This study focused on the action of the group of 2×2 diagonal matrices with entries in $GF(q)$ acting on 2- dimensional vector space over $GF(q)$. Therefore, the Burnside Lemma played a crucial role in determination of the number of orbits, ranks and subdegrees of $DL(2, q)$ acting on each orbit. Results obtained provided quality information to computer programmers who use the GAP software in research for studying groups and their representation, vector spaces and combinatorial properties.

Keywords: *Ranks, subdegrees, orbits, action of $DL(2, q)$ on F_q^2 .*

ON SUMS OF SQUARES INVOLVING INTEGER SEQUENCE

$$\sum_{r=1}^n w_r^2 + \frac{n}{3} d^2 = 3 \left(\frac{nd^2}{3} + \sum_{r=1}^{\frac{n}{3}} w_{3r-1}^2 \right)$$

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Abstract

Let w_r be a given integer sequence in arithmetic progression with a common difference d . The study of diophantine equations, which are polynomial equations seeking integer solutions, has been an interesting journey in the field of number theory. Historically, these equations have attracted attention of many mathematicians due to their intrinsic challenges and their significance in understanding the properties of integers. In this current study, we examine a diophantine equation relating the sum of squared integers from specific sequences to a variable d . In particular, the diophantine equation

$\sum_{r=1}^n w_r^2 + \frac{n}{3} d^2 = 3 \left(\frac{nd^2}{3} + \sum_{r=1}^{\frac{n}{3}} w_{3r-1}^2 \right)$ is introduced and partially characterized. The objective is to determine the conditions under which integer solutions for (w_r, d) exist within this diophantine equation. The methodology of solving this problem entails, decomposing polynomials, factorizing polynomials, and exploring the solution set of the given equation.

Keywords: *On sums of squares, integer sequence.*

RANKS, SUBDEGREES, AND SUBORBITAL GRAPHS OF THE PRODUCT ACTION OF AFFINE GROUPS

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Abstract

Affine group actions on Galois fields have been explored in prior research. Kangogo studied the affine group $Aff(q)$ acting on $GF(q)$, where q is a prime power. This study examines transitivity, computes ranks and subdegrees, and constructs suborbital graphs using the product action definition. Sims' procedure helps identify non-trivial suborbital graphs with girths 0, 3, 4, and 6.

Affine group $Aff(q)$ over Galois field $GF(q)$ is a group of all transformations of the form

$ax + b$, where $a, b \in GF(q)$ and $a \neq 0$, these elements can be viewed as $\begin{pmatrix} a & b \\ 0 & 1 \end{pmatrix}$. Let a group

G act transitively on a set Ω and G_a the stabilizer of a in G for $a \in \Omega$, then $Orb_G(a)$ is the Orbit of a in G . The G_a -orbits are called suborbits of G denoted by Δ_i and the number of them is the rank while the length of the suborbits is called the subdegrees of G on Ω . Sims (1967) introduced suborbital graphs for non-trivial suborbits of permutation groups. Kamuti (2019) studied stabilizers in the modular group and found them transitive and imprimitive.

Ranks and subdegrees assist in constructing suborbital graphs, offering insights for graph theory applications such as modeling electric circuits, optimizing transport networks, and improving backtrack searches for permutation groups. Computational tools MAGMA and GAP are used for implementation. For $G = G_1 \times G_2 = Aff(q_1) \times Aff(q_2)$ acting on $\Omega = \Omega_1 \times \Omega_2 = GF(q_1) \times GF(q_2)$, the rank is 4, and subdegrees are 1, $(q_1 - 1)$, $(q_2 - 1)$ and $(q_1 - 1)(q_2 - 1)$. The action is transitive, and all non-trivial suborbital graphs are undirected.

Keywords: Ranks, subdegrees, suborbital graphs, product action, affine groups.

STUDY OF W_3 - CURVATURE TENSOR ON LORENTZIAN PARA-KENMOTSU MANIFOLDS

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Abstract

This study undertakes a comprehensive analysis of curvature tensors on Lorentzian Para Kenmotsu manifolds focusing on W_3 -Curvature tensor. Properties of this Curvature tensor under various conditions on these manifolds are explored and their geometric implications examined. The study also includes investigations of W_3 -flatness, $(\xi - W_3)$ flatness, $(\phi - W_3)$ flatness and W_3 Semisymmetric on Lorentzian Para Kenmotsu manifolds and their connections to η - Einstein, Einstein and special η - Einstein. Additionally, The Ricci operator's behaviors on Lorentzian Para Kenmotsu manifolds under the conditions $W_3 \cdot Q = 0$, $Q \cdot W_3 = 0$ are analyzed. Expressions for this curvature tensor while considering the condition $W_3(\xi, X) \cdot W_3 = 0$, $R \cdot W_3 = 0$ and

$W_3 \cdot W_3 = 0$ are derived. Proves to determine whether these manifolds are flat will be provided. The findings of this study enhance understanding of the geometric properties of Lorentzian Para Kenmotsu manifolds in relation to W_3 curvature tensors.

Keywords: *Study of W_3 - curvature tensor, lorentzian para-kenmotsu manifolds.*

ON COUNTING THE NUMBER OF CYCLIC CODES OF LENGTH N OVER PRIME FIELDS

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Abstract

Cyclic codes are a cornerstone of coding theory. Many studies have extensively explored specific finite prime fields, $GF(p)$. However, a generalized framework for $GF(p)$ remains unexplored. Previous research has enumerated cyclic codes over $GF(13)$, $GF(17)$, $GF(19)$, $GF(23)$, $GF(31)$, and $GF(37)$, deriving significant findings for special cases where n assumes specific forms like $n = p^m$ or $n = a^m \cdot p^m$. Despite these advances, existing studies are often restricted to individual prime fields and lack a unified framework applicable across all $GF(p)$. This research develops a mathematical framework for counting cyclic codes over any prime field $GF(p)$. The methodology involves use of rigorous mathematical derivations and proofs to establish the relationship between number of cyclic codes, cyclotomic cosets and the factorization of $x^n - 1$ into irreducible polynomials over $GF(p)$. This framework provides a comprehensive understanding of how the structures of n and p influence the number of cyclic codes. Results show that the number of cyclic codes, N , over the prime fields can be expressed as $N = (p^y + 1)^C$, where C is derived from the number of cyclotomic cosets modulo $k \forall n = k \cdot p^y$. This work contributes to efficient design of error-correcting codes, strengthens the theoretical foundation for secure communication systems, and bridges theoretical concepts of pure mathematics.

Keywords: *Cyclic code enumeration, prime fields $GF(p)$, cyclic code enumeration index (N), cyclotomic cosets over $GF(p)$, irreducible polynomials factorization, counting cyclic codes.*

THE CONDITIONS UNDER WHICH THE NORM OF ELEMENTARY OPERATOR OF LENGTH TWO IS EXPRESSIBLE IN TERMS OF ITS COEFFICIENT OPERATORS IN TENSOR PRODUCT of C^* -Algebra :AN APPLICATION OF STAMPFLI'S MAXIMAL NUMERICAL RANGE

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Abstract

Many researchers have studied the properties of elementary operators, including numerical ranges, spectrum, compactness and rank, in great depth, and numerous results have been obtained using different approaches such as spectral resolution theorem, tracial geometric mean, finite rank operator and Stampfli's maximal numerical range. The conditions under which the norm property can be expressed in terms of its coefficient operators, has also been considered in many studies but remains unresolved. This study sought to determine the application of Stampfli's maximal numerical range by determining the conditions under which the norm of the elementary operator of length two can be expressed in terms of its coefficient operators. The study used Stampfli's maximal numerical range and techniques of tensor products of C^* -Algebras to express the norm of an elementary operator of length two in terms of its coefficient operators. Finally, the study used Cauchy Schwartz's inequality to determine the upper bound. In this study, the norm of the elementary operator is expressed in terms of coefficient operators and shown to be, $\|O_2\| = \sum_{i=1}^2 O_{E_i \otimes F_i, G_i \otimes H_i} = \sum_{i=1}^2 \|E_i\| \|F_i\| \|G_i\| \|H_i\|$.

where $O_{E_i \otimes F_i, G_i \otimes H_i}$ are fixed elements in $B(Z \otimes L)$ the set of bounded linear operator of tensor product of Hilbert space Z and L .

Theme: Integration of innovation and technology for sustainable interdisciplinary collaboration

Keywords: *Elementary operator, stampfli's maximal numerical range, and tensor product.*

FINITE SUM OF SINE AND COSINE SERIES

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Abstract

Understanding sine and cosine series is crucial in various disciplines including applied mathematics, physics, engineering, signal processing, among other areas in applied sciences. This study's main objective is to derive sums of widely required trigonometric series of sine and cosine functions. These sums play a key role in the analysis of periodic functions. Key results from this study include closed-form expressions for sums of sine and cosine functions.

Keywords: *Trigonometric series, finite sum, sine series, cosine series, periodic functions, Fourier series.*

ON FOURIER TRANSFORM OF A BINOMIAL K -FIBONACCI SEQUENCE

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Studies have been conducted on binomial sequences and Fibonacci sequences. However, a generalization of the binomial K-Fibonacci sequence is still missing. Furthermore, its Fourier transform has not yet been explored. The binomial K-Fibonacci sequence is an intriguing mathematical construct that combines two fundamental sequences: the K - Fibonacci sequence and the binomial coefficients. By leveraging the recursive nature of K -Fibonacci numbers and the combinatorial properties of binomial coefficients, this sequence generates terms that exhibit unique growth patterns, distinct from those found in either of the original sequences. In this work, we characterize the binomial K -Fibonacci sequence by generalizing the binomial Fibonacci sequence. Moreover, we construct a Fourier transform on the binomial K -Fibonacci sequence, explore its initial terms, and examine its applications in fields such as natural growth models, financial forecasting, and cryptographic algorithms. A deep study of the binomial K -Fibonacci sequence reveals both its mathematical elegance and its potential for practical applications in complex, hierarchical systems. These include spectral recurrences, number theory, feature extraction in machine learning, signal compression, and fractal quasi-periodic structures.

Key words: *Fourier transform, binomial sequence, k –fibonacci numbers.*

CHARACTERIZATION OF AUTOMORPHISMS OF ZERO DIVISOR GRAPH OF NILRADICALS OF SOME CLASSES OF LOCAL RINGS

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Abstract

The study of zero divisor graphs $G(R)$ of rings R was first introduced by Beck in 1988. Beck isolated all $Z(R)$ of the ring R and considered them as the vertex set of $G(R)$. Beck's focus was on the chromatic number $\chi(G(R))$ of the graph $G(R)$. Beck illustrated that $G(R)$ is simple, connected, and $\text{diam}(G(R)) \leq 2$. Besides, Beck further established that $\chi(G(R)) < 4$. In 1999, Anderson and Livingstone standardized Beck's graph $G(R)$ by $\Gamma(R)$. They considered $Z(R)^*$ and showed that $\Gamma(R)$ is simple, connected, and that $\text{diam}(\Gamma(R)) \leq 3$. The study on automorphisms of $\Gamma(R)$ have helped in creating a link between the commutative algebra and graph theory. Various studies have been carried out by researchers to visualize and better understand algebraic structures of rings in graph theory. This approach is most effective when applied to commutative local rings. The objective of this study is to characterize automorphisms of $\Gamma(R)$ of nilradicals of some classes of local commutative finite rings utilizing either Livingstone's and Anderson's zero divisor graph or Muly's condensed zero divisor graph. The methodology involves using combinatorial algorithmic technique to divide the rings into disjoint subsets of nilpotent and non-nilpotent elements, then constructing $Z(R)^*$ graphs and using case-by-case analysis to investigate maps that preserve structure within the graph. Structure-preserving maps are then identified using mathematical induction. Results and structure of $Z(N(R))$ will depend primarily on the order of nilpotent elements and their connections, which will give a clear picture of how these nilradicals interact. Even though automorphisms can reflect many properties of the ring, it is still unknown whether the automorphism group can distinguish between such rings, especially in higher-dimensional contexts. This study will help determine how such automorphisms are useful in categorizing different local rings.

Keywords: *Automorphisms, rings, nilradicals, zero divisor graphs.*

AN ALGORITHM FOR SOLVING FIXED-POINT PROBLEMS FOR CONTRACTIONS IN HILBERT SPACES

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Abstract

Several techniques have been employed over the years to come up with a solution to fixed point problems. Getting a general solution to fixed point problems is difficult since there are numerous fixed point problems and different operators acting on different spaces. Therefore, most studies embark on particular spaces with particular maps and hence unique algorithms are constructed and their convergences determined. In this study, the main objective is to construct an algorithm and solve a fixed-point problem for contractions in Hilbert spaces. We analyze the fixed-point problem which states as follows: Let H be a Hilbert space, C a strict subset of H and x_n be a sequence in H . Find a vector x^* in C such that T^*x^* belongs to the set of all fixed points of T $Fix(T)$; whereby T is a contractive mapping on H and T^* its adjoint. The methodology involves development of an algorithm for the stated problem, determining boundedness of the sequences and convergence of the results and carrying out numerical analysis using Python. For the results, we have obtained a solution to the fixed-point problem stated particularly for the contractions in Hilbert spaces. We have developed an algorithm for solving the fixed-point problem, determined boundedness of the sequence generated by the algorithm developed, tested for the convergence of the developed algorithm and finally numerically solved the fixed-point problem stated herein using Python. The results are very significant in solving problems of convex optimization.

Keywords: *Fixed point problem, contraction, hilbert space.*

STUDY OF W_5 - CURVATURE TENSOR ON LORENTZIAN PARA-KENMOTSU MANIFOLDS

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Abstract

This paper investigates the properties of W_5 curvature tensors on Lorentzian Para Kenmotsu manifolds. Properties of this Curvature tensor under various conditions on these manifolds are explored and their geometric implications are examined. The study also includes investigations of W_5 -flatness, $(\xi - W_5)$ flatness, $(\phi - W_5)$ flatness and W_5 Semisymmetric on Lorentzian Para Kenmotsu manifolds and their connections to η - Einstein, Einstein and special η -Einstein. Additionally, The Ricci operator's behaviors on Lorentzian Para Kenmotsu manifolds under the conditions $W_5 \cdot Q = 0$, $Q \cdot W_5 = 0$ are analyzed. Expressions for this curvature tensor while considering the condition $W_3(\xi, X) \cdot W_5 = 0$, $R \cdot W_5 = 0$ and $W_5 \cdot W_5 = 0$ are derived. Proves to determine whether these manifolds are flat will be provided. The findings of this study enhance understanding of the geometric properties of Lorentzian Para Kenmotsu manifolds in relation to W_5 curvature tensors.

Keywords: W_5 - Curvature tenso, lorentzian para-kenmotsu manifolds.

MODELLING VOLATILITY OF MULTIVARIATE TIME SERIES USING VAR-LSTM-GARCH HYBRID MODEL

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Abstract

Volatility is characterized by high degree of unpredictability, and therefore in the context of online trading, volatility forecasting is very important. This is because of the underlying variables, which include the feelings of investors and their reactions to news that are difficult to predict. To capture the linear, nonlinear, and volatility clustering features that are present in financial time series data, several univariate models such as the Vector Autoregressive (VAR), Long Short-Term Memory (LSTM), and Generalized Autoregressive Conditional Heteroscedastic (GARCH) have been considered. Existing studies have shown researchers combining two univariate models such as the VAR-LSTM, LSTM-GARCH, and VAR-GARCH to model financial time series data. However, these bivariate models are limited in that they can only describe two of the stylish aspects of financial time series data. Additionally, these bivariate models have been applied to simulate univariate instances without considering the interactions that would probably be seen in multivariate scenarios. There is therefore the need to develop more robust models that address the limitations of both the univariate and the bivariate models. This research therefore addresses this gap by combining three univariate models to create a hybrid VAR-LSTM-GARCH model that can model the multivariate features of variables in a multivariate dataset. Simulated data for the daily VIX index, US Dollar Index, and S&P 500 E-mini futures prices for three years was used in the model building process. A VAR (5) model was selected as the best model since it had the smallest AIC (-11.3421). The residuals of the VAR were used to train an LSTM model using the Adam optimizer and squared loss function. The residuals from the LSTM were used to model volatility using an M-GARCH (1,1) of the three variables and the resultant hybrid model used with the test set to determine the effectiveness of the model. The mean squared errors of the three variables were S&P 500 E-mini futures (MSE=0.04357), VIX (MSE=2.06324), and US Dollar Index (MSE=0.82365). The results imply that hybrid models are effective in modeling volatility in correlated variables. The study therefore recommends the combination of VAR, LSTM and GARCH models to come up with a more robust model that can identify and predict patterns in multivariate time series data.

Keywords: *Volatility, hybrid models, long short-term memory (LSTM) model, vector autoregressive (VAR) model; multivariate generalized autoregressive conditional heteroscedastic model (M-GARCH).*

MATHEMATICAL MODEL OF SEXUAL ORIENTATIONS WITH RECOVERY CENTERS

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Abstract

Homosexuality is now becoming a global trend. In this paper, a comprehensive mathematical model of sexual orientations with recovery centers in a population is developed using a set of ordinary differential equations and solved by using the fourth-order Runge-Kutta method. The population is divided into ten compartments namely; Males (M), Females (F), gays (G), lesbians (L), heterosexual males H_m , heterosexual females H_f , bisexual males B_m , bisexual females B_f , recovery centers for male R_m and recovery centers for females R_f . The epidemic threshold and equilibria for the model are determined and stabilities are investigated. Comprehensive qualitative analysis of the model includes invariance of solutions and permanence. We assume that homosexuality (same-sex practice) is not hereditary rather people are convinced to practice same-sex marriage and people can be re-convinced after they have recovered. We further assumed that Males can only be influenced by gays or bisexual males to homosexuality and the female population can only be influenced by lesbians and bisexual females to homosexuality. Numerical simulations of the model show that as long as reproductive numbers are greater than unity, homosexuality will exist in the population. It was also established that the higher the recruitment rates the higher the prevalence of homosexuality and vice versa. Lastly, Recovery centers are reducing homosexuality within the population and hence more recovery centers need to be established to curb homosexuality.

Keywords: *Mathematical mode, sexual orientations, recovery centers.*

SUBTHEME: ICT AND DIGITAL TRANSFORMATION**DEVELOPMENT AND EVALUATION OF A CLOUD SECURITY FRAMEWORK FOR KENYAN FINTECHS**Omieno O.A.,¹ Mwikya R.J.,² Ngarenon T.¹¹African Institute for Mathematical Sciences (AIMS), SENEGAL²Kirinyaga University, KENYACorrespondence: jmwikya@kyu.ac.ke**Abstract**

This study focuses on developing a hands-on security measurement framework index and validating a security measurement framework tailored for Kenyan FinTechs operating in cloud environments. The study objectives were to create a hands-on security measurement framework index combining essential security parameters for cloud security operations and to validate the framework's usefulness for FinTechs in Kenya. Using the Goal-Question-Metric (GQM) methodology, a framework was developed that integrates security metrics and sub-metrics to assess cloud security performance. The framework was validated against international standards such as COBIT, ITIL, and ISO, and its effectiveness tested through experimental analysis and questionnaire-based data collection. The target population consisted of 51 FinTech companies in Kenya registered with the Central Bank of Kenya as of 2024. Results demonstrated that the framework successfully addressed key cloud security challenges, including internal threats, data destruction, and regulatory compliance. The study concludes that the framework provides a practical tool for FinTechs to measure and improved their cloud security performance, ensuring alignment with global standards and local regulatory requirements. There is need for implementation of the framework, continuous monitoring, and collaboration with cloud service providers to enhance security.

Keywords: *Cloud security, security measurement framework, development, evaluation, FinTechs.*

CLOUD SECURITY CHALLENGES AND ASSESSMENT FRAMEWORK FOR KENYAN FINTECHS

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Abstract

The rapid adoption of cloud computing by FinTechs in Kenya has brought significant operational advantages, but it has also exposed these organizations to serious security challenges. This study addresses the critical security issues faced by Kenyan FinTechs, focusing on internal threats and data destruction. The study objectives were to investigate the cloud security challenges Kenyan FinTechs faced and develop a security assessment framework to address these challenges. The target population consisted of 51 Fintech companies in Kenya registered with the Central Bank of Kenya as of 2024. Using a mixed-method approach, data was collected using questionnaires and experimental analysis of the Own Cloud platform. Results showed that internal threats, such as rogue administrators, and data destruction issues, such as incomplete deletion, are major concerns. A security assessment framework was developed and validated against international standards like COBIT, ITIL, and ISO. The framework provides a structured approach to identifying and mitigating cloud security risks, offering a practical tool for FinTechs to enhance their cloud security infrastructure. There is need for increased awareness and training for employees, improved collaboration with cloud providers, and implementation of robust security policies to address these challenges.

Keywords: *Cloud security, security framework, FinTechs, standards.*

USER-CENTRIC DESIGN: ISSUES AND CHALLENGES

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Abstract

This study investigated the issues and challenges associated with user-centric design, emphasizing usability principles and user experiences. The study addresses how user-centered methodologies contribute to digital and physical product development and identifies obstacles to their implementation. The study was prompted by the need to align user expectations with business objectives, stakeholder interests, accessibility requirements, and technological capabilities. The primary objective was to explore how user-centric design methodologies enhance digital experiences while identifying barriers such as stakeholder conflicts, technological limitations, and user inclusivity challenges. The target population comprised digital product developers, UX designers, and end-users. Using a stratified random sampling technique, a sample size of respondents was selected. Data were collected using questionnaires and interviews. To ensure validity, research instruments underwent expert review, and reliability testing was conducted using Cronbach's alpha. Quantitative data was analyzed using descriptive and inferential statistics, while qualitative data was subjected to thematic analysis. Results showed that resistance to change, technological constraints, and user diversity were major impediments to effective user-centric design. Additionally, concerns about data privacy and ethical considerations posed significant challenges. The study highlights the importance of aligning design strategies with user needs and business goals while adopting inclusive and ethical design practices. There is also need for stakeholder engagement through participatory design approaches, continuous user feedback loops, and the adoption of agile methodologies to address evolving user needs. There is also need for comprehensive training for designers on inclusivity and ethical design standards. This study contributes to the body of knowledge by offering practical strategies to overcome the challenges of implementing user-centric design, ultimately enhancing user experience and system efficiency.

Keywords: *User-centric design, usability, user experience, design challenges.*

AN ALGORITHM FOR RECOGNIZING AND TRANSLATING FINGER-SPELLING-BASED HAND MOVEMENTS TO TEXT AND SPEECH RECOGNITION

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Abstract

Real-time sign language to text and speech recognition refers to a technological system designed to translate sign language into written text and audible speech instantaneously. Real-time sign language technology utilizes advanced algorithms and sensors, often involving computer vision and machine learning techniques, to interpret hand movements and facial expressions integral to sign language. Currently, Deaf and Dumb individuals heavily rely on manual communication through Sign Language which while effective, can pose limitations when interacting with the broader hearing population and result in miscommunication and limited engagement which calls for a more comprehensive solution. The aim of this study was to identify the key challenges faced by deaf and dumb individuals in their communication, design and implement a robust sign language recognition algorithm for translation and evaluate the effectiveness and usability of the proposed system in real-world communication scenarios. Exploratory and descriptive research designs were used in this research. An extensive and thorough investigation was undertaken to establish a solid understanding of sign language, the specific requirements and challenges faced by Deaf and Dumb individuals, and the state of existing technologies related to sign language recognition and translation. An algorithm for recognizing and translating finger-spelling-based hand movements was developed and evaluated using control experiments and participation from deaf and dumb individuals to assess the accuracy in translating finger-spelling-based hand movements and near real-time operation. Results indicated that the system was effective, usable, and matched real-world performance in facilitating meaningful communication for deaf and dumb individuals. This work marks a significant milestone in advancing communication accessibility for deaf and hard-of-hearing individuals.

Keywords: *Real-time sign language, finger-spelling-based hand movements, text and speech recognition.*

ARTIFICIAL INTELLIGENCE FOR SUSTAINABLE AGRICULTURE; ENHANCING CROP PRODUCTIVITY THROUGH MACHINE LEARNING IN KENYA

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Abstract

Agriculture is currently regarded as the foundation of food security and the economy. However, smallholder farmers in developing countries face numerous challenges, including climate change, low productivity, and adverse climatic conditions. Artificial Intelligence (AI) has now become a distinguished technology for enhancing farming productivity and efficiency. However, use of Machine Learning (ML) has remained limited in sub-Saharan Africa due inadequate infrastructure and technology uptake. This study examines potential of using artificial intelligence to implement predictive modeling in Kenyan agriculture, effectiveness of an AI-based system for enhancing crop yield forecast and appropriate planting timetable. It sought to confirm whether Machine Learning (ML) algorithms advise prevention and reduction of various risks in farming and increase yields. Descriptive data from weather patterns, soil tests, and crop yield data of 500 sample farms in Kirinyaga County were used. Consequently, an optimal planting and harvesting time was predicted using the Random Forest regression model. Performance of the model was then evaluated using Mean Absolute Error (MAE) and R^2 value. Further, assessment of barriers to land-holder adoption was sourced from a survey among the farmers and expert interviews. Performance of the AI model was completed by using the R^2 score with the result reaching the value of 0.91, which indicates high predictive ability. Farmers adopting the given recommendation of the AI had an increased crop yield of 27%. However, factors like lack of computer literacy and amenities that support the use of this system reduced its popularity. This study underscores AI's role in increasing agricultural sustainability, as well as increasing the efficiency of resource utilization in the agricultural sector. Climate risks can be managed by employing decision support systems that utilize artificial intelligence. Future research should focus on the integration of AI with IoT using precision farming models and government policies for adoption in developing nations.

Keywords: *Artificial intelligence, sustainable agriculture, crop productivity machine learning, Kenya.*

A FRAMEWORK FOR ENHANCING PERSONALIZED LEARNING OF COMPUTER PROGRAMMING USING LARGE LANGUAGE MODELS

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Abstract

This paper explores the integration of large language models (LLMs) to enhance personalized learning in introductory computer programming courses, focusing on the C programming language. Programming education often faces challenges such as meeting diverse learner needs, providing real-time feedback, and aligning learning content with curriculum goals. These issues are particularly critical for beginners who struggle with debugging, understanding abstract concepts, and applying theory to practice. Despite advancements in generative AI, comprehensive frameworks for systematically leveraging LLMs to generate accurate, coherent, and curriculum-aligned programming content tailored to individual learner needs remain underexplored. This study addressed this gap by presenting a framework that utilizes prompt engineering to refine AI-generated content, ensuring its coherence, accuracy, and educational relevance. Through a mixed-methods approach involving surveys, participant observations, and a quasi-experimental design, this research evaluated the efficacy of LLM-generated outputs in enhancing student engagement and learning outcomes. Key findings include effective strategies to reducing machine hallucinations, optimize content quality, and fostering critical thinking through student and educator collaboration. The framework demonstrates the potential of LLMs to transform programming education by enabling scalable, adaptive, and personalized learning experiences.

Keywords: *Large language models, prompt engineering, personalized learning, computer programming education, generative AI.*

ETHICAL QUANDARY OF ARTIFICIAL INTELLIGENCE IN UNIVERSITY EXAMINATIONS PLAGIARISM

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Abstract

Examinations period is a tense moment in all universities around the world. Students wanting to capitalize on generative artificial intelligence (AI) assistive technology to circumvent credible examination regulations in place, whilst on the other hand, the examination invigilators wanting to use Artificial Intelligence tools to counter examination cheating. When it comes to preparation and examination administering, artificial intelligence, a transformative force that presents an ethical quandary, to use artificial intelligence tools to plagiarize examinations or to use other Artificial Intelligence assistive technology to nail down the culprit students who use the artificial intelligence to plagiarize. This research investigates the ethical quandary of artificial intelligence in university examinations plagiarism through review and analysis of the existing literature. Specific Objectives of the research; To outline generative artificial intelligence (AI) assistive technology applied by students and lecturers to counter exam cheats, To find out investigate the techniques students use to circumvent laid out exam rules; To detail some reasons students give for their repetitive use of generative artificial intelligence (AI) assistive technology in their coursework and end of semester examinations and To investigate how adoption of sophisticated AI-driven plagiarism detection systems can aid reduce the menace. The researcher employed a case study design and used a maximum diversity sampling method. Data collection utilized open-ended questions, guided by Mason's framework of computer ethics, encouraging participants to provide detailed responses. Data were analyzed using descriptive analysis. Results reflected participants' diverse views on Ethical Quandary of Artificial Intelligence in University Examination Plagiarism. This study focused on the use of assistive artificial intelligence in collaborative automated examination administration process, intelligent examination process monitoring systems. The researchers explore the quandary in implementing AI guardrails to prevent plagiarism during University examinations.

Keywords: *Artificial intelligence, assistive technology, ChatGPT, ethical, plagiarism and quandary.*

ARTIFICIAL INTELLIGENCE AND THE SOCIETY: NAVIGATING THE IMPACT OF AI ON SOCIAL JUSTICE

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Abstract

In an age characterized by rapid technological advancement, the transformative potential of Artificial Intelligence (AI) stands both as a beacon of hope, promise and a challenge. It has become increasingly evident that AI is not just a tool for innovation but, when deployed responsibly and ethically, can be a force for social innovation and change, improving equity and human rights, shaping societies and redefining the global landscape. The potential of AI to impact society has been noted by scholars, while it has been touted as providing solutions to many social problems, it also has the potential to propagate existing inequalities and injustices. It has thus been shown to replicate, amplify and even exacerbate biases related to race, gender and other social factors. It is, therefore, essential to consider the implication of AI development on issues like justice, human dignity and human rights in order to ensure that AI benefits equitably across populations and demographics without amplifying the already existing inequalities. This paper, seeks to examine the impact of AI on justice, human freedom and human rights especially those rights that are most impacted or most likely to be impacted by AI. The paper posits that AI can impact social justice through biased decision making, job displacement and unequitable resource allocation.

Keywords: *Artificial Intelligence (AI), social justice, human rights, freedom, race, gender.*

A HYBRID DEEP LEARNING MODEL FOR CROP DISEASES AND PEST CLASSIFICATION

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Abstract

This study aimed to enhance classification accuracy for crop disease and pest identification through a hybrid deep learning model integrating Convolutional Neural Network (CNN) and Support Vector Machine (SVM). The study addressed the challenge of low classification accuracy in existing models. The objectives were to develop and evaluate the hybrid model, compare its performance against other deep learning models, and assess its reliability and effectiveness. The target population comprised agricultural datasets of maize, tomato, and pest images. A stratified random sampling technique was used to select a representative sample of 5,000 images from each dataset. The study utilized image datasets from open-source agricultural repositories. Convolutional Neural Networks (CNN) were used for feature extraction, while SVM classified the extracted features, addressing class overlap issues common in CNNs. Research instruments included deep learning frameworks and Python-based analytical tools. Model validation was performed using k-fold cross-validation, and reliability assessed through precision, recall, and F1-score metrics. Data was analyzed using performance metrics such as accuracy, confusion matrices, and receiver operating characteristic (ROC) curves. The proposed CNN+SVM hybrid model achieved 97.13% accuracy on maize, 93.76% on tomato, and 97.02% on pest datasets, outperforming benchmark models like DenseNet, AlexNet, and EfficientNet. Results indicate that the hybrid model significantly enhances classification accuracy, supporting more reliable early detection of crop diseases and pests. There is need to integrate the hybrid model into precision agriculture tools to enable timely interventions. Future research should explore the model's applicability to other crops, optimize SVM kernels, and incorporate real-time data for enhanced diagnostic performance.

Keywords: *Hybrid deep learning model, CNN, SVM, crop disease detection, pest classification.*

ARTIFICIAL INTELLIGENCE FOR SUSTAINABLE AGRICULTURE: ENHANCING CROP PRODUCTIVITY THROUGH MACHINE LEARNING IN KENYA

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Abstract

Agriculture is currently regarded as the foundation of food security and the economy. However, smallholder farmers in developing countries face numerous challenges, including climate change, low productivity through the sector, and adverse climatic conditions. Artificial Intelligence (AI) has now become a distinguished technology for enhancing farming productivity and efficiency. However, the use of Machine Learning (ML) has remained low in sub-Saharan Africa due to infrastructural and technical requirements. The following paper examines the potential of using artificial intelligence to implement predictive modeling in Kenyan agriculture. Engaging this research, the effectiveness of an AI-based system for enhancing crop yield forecast and appropriate planting timetable was examined. The study sought to confirm whether Machine Learning (ML) algorithms can give recommendations that would prevent and reduce various risks in farming and increase yields. Descriptive data from weather patterns, soil tests, and crop yield data of 500 sample farms in Kirinyaga County were used. Consequently, an optimal planting and harvesting time was predicted using the Random Forest regression model. Performance of AI model was then evaluated using Mean Absolute Error (MAE) and R^2 value. Further, assessment of barriers to land-holder adoption was sourced from a survey among the farmers and expert interviews. The performance of the AI model was completed by using the R^2 score with the result reaching the value of 0.91, which indicates high predictive ability. Farmers adopting the recommendation of the AI reported increased crop yield of 27%. However, factors like lack of computer literacy and lack of amenities that support the use of this system reduce its popularity. This study underscores AI's role in increasing agricultural productivity, as well as increasing the efficiency of resource utilization in the agricultural sector. Climate risks can be managed by employing decision support systems that utilize artificial intelligence. Future research should focus on the integration of AI with IoT using precision farming models and government policies for its adoption in developing nations.

Keywords: *Artificial intelligence, sustainable agriculture, crop productivity, machine learning, Kenya*

DIGITAL LITERACY FOR KNOWLEDGE MANAGEMENT: ASSESSING INITIATIVES FOR ENHANCING ACCESS AND UTILIZATION OF DIGITAL RESOURCES: A CASE STUDY OF EGERTON UNIVERSITY LIBRARY

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Abstract

Digital literacy is a fundamental component of knowledge management due to its ability to facilitate effective access and use of digital technologies in educational institutions. This study examines the initiatives taken towards improving digital literacy at Egerton University. Special emphasis is placed on the role of the University Library in helping to enhance the development of digital skills for better access and use of information. This study conducts a systematic literature review by analyzing published works on the set of frameworks on digital literacy, practices of academic knowledge management, and the problems encountered in the use of digital resources. The librarians at Egerton University Library have put in place an array of initiatives aimed at training students and faculty which include advanced searching courses, and online teaching tools. Furthermore, the provision of digital repositories, open access, and e-learning support services has made the attainment of knowledge much easier. The library has also focused on the provision of skills needed to evaluate information in an era when various emerging technologies such as artificial intelligence (AI) are becoming common in research. Despite these advancements, persistent challenges include **inadequate digital infrastructure, inconsistencies in digital competence, and limited awareness of available digital resources**. By analyzing existing literature and the library's interventions, this study examines the prevailing drivers of digital literacy adoption and use in knowledge management. The findings will identify the best practices, loopholes, and improvement areas for digital literacy strategy in Egerton University. To us, the creation of digital literacy programs is important in a bid to reinforce knowledge management, create equitable access to learning resources, and create a culture of learning for life. The research also contributes to the debate concerning digital inclusion, innovative tertiary education, and changing roles of university libraries in knowledge-based academic institutions.

Keywords: *Digital literacy, knowledge management, digital repositories, open access, artificial intelligence, digital inclusion.*

IMPLICATIONS OF GENERATIVE ARTIFICIAL INTELLIGENCE ON HIGHER EDUCATION IN KENYA

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Abstract

Artificial intelligence (AI) refers to the ability of a digital machine to perform tasks commonly associated with intelligent beings, and its associated technologies are divided into various branches, such as computer vision, speech, machine learning, big data, and natural language processing. AI is witnessing an explosive growth leading to transformation in the ways people interact, collaborate, communicate, trade, live and work. As artificial intelligence (AI) continue to evolve, opportunities and risks continue to emerge. Education sector has not been spared from these opportunities and risks especially those related to generative artificial intelligence. Generative artificial intelligence is artificial intelligence capable of generating text, images, videos or other data using generative models often in response to prompts. Generative artificial intelligence (AI) technologies, such as language models and deep learning algorithms, have seen rapid advancements in recent years, revolutionizing the education sector in a significant way. However, the true impact of generative artificial intelligence (AI) on higher education remains uncertain. Generative AI technology is rapidly evolving in complexity and type of use opening up a world of endless possibilities, while also generating significant concerns about academic integrity, ethics, access and bias. Reviews of the relevant literature have not examined how generative AI technologies have been integrated into each of the four key educational domains of learning, teaching, assessment, and administration. The relationships between generative AI technologies and learning outcomes for students and teachers have also been neglected. This systematic review explores the implications of generative AI on higher education, focusing on its potential to transform teaching, learning, assessment and administrative processes. This will help in understanding the opportunities and challenges of generative artificial intelligence on higher education. The study finally presents recommendations on utilization of generative AI in higher education.

Keywords: *Generative artificial intelligence, higher education, teaching, learning, machine learning, large language models, assessment, administrative processes, personalization, ethical considerations, educational technology.*

THE EMPATHY OF DIGITAL INSTITUTIONAL REPOSITORY SERVICE PROVISION AT SELECTED UNIVERSITIES IN MERU COUNTY

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Abstract

Postgraduate students consult institutional repository services in course of doing their research and scholarship journey. Thoughtfully, careful consideration ought to be undertaken to ensure the needed services are readily available. In these circumstances, empathy is showcased by the perceived usefulness of repository services through allowing virtual, multiple accessibility, navigable websites, downloadable documents, search history tracking and system notifications. In spite of that, post-graduate students detaching from accessing digital institutional repository DIR services continue to become common. This is showcased by challenges in empathy-related aspects such as inaccessibility of the DIR at some times and lack of notifications when new documents are published. The purpose of this study was to assess the level of empathy in digital institutional repository services in universities in Meru County and determine how adopting the SERVQUAL model can improve service provision. It was majorly premised to find out how espousing SERVQUAL model have the ability to improve DIR services among post-graduate students and the model also served as the theoretical framework. The study was conducted in Meru County, Kenya and the engaged universities were Meru University of Science and Technology (MUST) and Kenya Methodist University (KeMU). It adopted descriptive survey research design. The target population was 910; comprised post-graduate students and library heads of sections. Purposive sampling and simple random sampling techniques were used in drawing a sample size of 101 respondents, which comprised of 10 head of section-librarians, and 91 students. Data was collected by means of questionnaires and interviews from the students and librarians respectively. Reliability of research instruments was ascertained and Chrobach alpha coefficients of 0.891 for empathy and 0.896 for DIR Service Provision were obtained. Quantitative data was analysed using SPSS, then, computed descriptive and inferential statistics while the qualitative data was analysed thematically. The findings of the study indicated that, empathy level in the institutional repository was satisfactory. The study concludes that while the institutional repository services in selected universities in Meru County exhibit empathy through personal interactions, they lack essential automated features such as notifications and search history tracking, which impact user experience. System librarians, in collaboration with ICT managers, should enhance the DSpace software to include automated notifications and retrieval history tracking. The presented results also implicate on institutional repository policies, measures and practices to include important activities such as staff retooling, staff code of conduct, etiquette and staff ethics in university libraries.

Keywords: *Empathy in digital library services, post-graduate students, SERVQUAL model, digital institutional repositories (DIRs), service provision*

SUBTHEME: INFORMATION & KNOWLEDGE MANAGEMENT**EXPLORING KNOWLEDGE MANAGEMENT AND INFORMATION TECHNOLOGY AS CATALYSTS FOR INNOVATION IN MSMES: A CASE STUDY OF BUNGOMA COUNTY**

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Abstract

This study investigated the role of knowledge management (KM) and information technology (IT) in driving innovation and enhancing performance within micro, small, and medium-sized enterprises (MSMEs) in Bungoma County. The study assessed the impact of underutilized KM and IT on performance outcomes. The specific objectives were to examine KM and IT practices, evaluate their correlation with innovation, and analyze their influence on MSME performance. Using a descriptive survey design, the study sampled 30 MSMEs from a target population of 50 through stratified random sampling. Data was collected using structured questionnaires and interviews, with instrument validity ensured by expert review and reliability confirmed via a Cronbach's alpha score of 0.82. Descriptive and inferential statistics were employed in data analysis. Results demonstrated strong positive relationship between KM, IT capabilities, and innovation, with external environmental factors further boosting performance outcomes. There is need for increased investment in digital tools, knowledge-sharing platforms, and capacity-building initiatives to stimulate innovation. Additionally, policymakers should create supportive frameworks for technology adoption to strengthen MSME competitiveness. The research contributes valuable insights to the discourse on leveraging KM and IT to foster innovation and drive performance improvements in emerging markets.

Keywords: *Knowledge management, information technology, innovation, MSMEs, Bungoma County.*

AN INVESTIGATION OF THE CONTRIBUTION OF PUBLIC UNIVERSITY LIBRARIES TO QUALITY EDUCATION THROUGH DIGITAL INCLUSION IN KENYA

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Abstract

Public university libraries in Kenya play a vital role in enhancing quality of education through their efforts to promote digital inclusion. This study investigated how these libraries contribute to quality education by providing access to digital resources and supporting digital literacy among students and faculty. The objectives of the study were to: assess availability and accessibility of digital resources in public university libraries, examine the role of these libraries in promoting digital literacy, evaluate effectiveness of digital platforms in improving learning outcomes, and identify challenges faced by libraries in implementing digital inclusion strategies. A mixed-methods approach was used, involving surveys and interviews with library staff, students, and faculty from selected public universities in Kenya. Results showed that while many libraries have made significant strides in integrating digital resources, challenges such as inadequate funding, limited digital infrastructure, and insufficient digital literacy programs remain. Nevertheless, these libraries play a crucial role in providing equitable access to information, supporting academic success, and bridging the digital divide. In order to fully realize their potential in contributing to quality education, public university libraries in Kenya should increase investment in digital infrastructure, expand digital literacy training programs, and enhance availability of e-learning platforms. There is need for government to increase support for digital initiatives, improved staff training, and development of comprehensive digital inclusion strategies.

Keywords: *Public university libraries, digital inclusion, quality education, digital literacy, Kenya, library services.*

KNOWLEDGE TRANSFER AND EMPLOYEE ENGAGEMENT IN BEVERAGE PROCESSING FIRMS IN KENYA

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Abstract

Knowledge transfer has emerged as a strategic process in the modern business environment that sustains competitive edge due to the exchange of novel ideas among employees. However, empirical evidence on knowledge transfer and employee engagement reported different focus on performance, leadership, learning, innovation and competitiveness. This study investigated how knowledge transfer influences employee engagement in five beverage processing firms operating in Nairobi City County in Kenya. The study examined how training programs as one of knowledge transfer initiatives influences employee engagement in beverage processing firms in Kenyan context. The study's conceptual framework was based on a review of both theoretical and empirical literature. It was anchored on three theories: knowledge-based review, employee engagement and social exchange theories, which promote a culture of continuous learning in beverage processing firms. A descriptive survey design was used to gather detailed information from middle and operational-level employees from the five beverage processing firms. A purposive sampling along with stratified and simple random sampling methods were used to collect primary data from 99 employees through a structured questionnaire with both open and closed questions. Results showed that implementation of training programs has a positive impact on employee engagement through individual skills development, improved job performance, which in turn boosts engagement, and improve knowledge management. Future studies should focus on the impact of other factors such as organization culture, rewards systems and work-life balance on employee engagement in manufacturing sector. Outcomes of such studies would help leadership and policymakers explore knowledge transfer strategies as a means to remaining competitive.

Keywords: *Knowledge transfer, employee engagement, training.*

HARNESSING DIGITAL TECHNOLOGIES FOR ENVIRONMENTAL INFORMATION AWARENESS AND SUSTAINABLE PRACTICES

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Abstract

Environmental challenges necessitate innovative strategies for effective information dissemination and awareness creation. This study explored how digital technologies, including social media platforms, Artificial Intelligence (AI), big data analytics, the Internet of Things (IoT), and Geographic Information Systems (GIS), enhance environmental awareness and promote sustainable environmental practices. The study investigated the role of digital technologies in environmental information sharing and their impact on sustainable behaviors. The study evaluated the effectiveness of digital platforms in raising environmental awareness, identifying challenges in technology adoption, and proposing strategies for improvement. The target population comprised environmental professionals, digital technology experts, and community stakeholders. Using purposive sampling, 120 participants were selected for in-depth interviews and surveys. Research instruments included structured questionnaires and interview guides, whose validity was ensured through expert review, and reliability tested using a pilot study with Cronbach's alpha coefficient of 0.85. Quantitative data was analyzed using descriptive and inferential statistics, while thematic analyses was used for qualitative data. Digital technologies significantly enhanced environmental awareness through real-time monitoring, interactive learning, and stakeholder engagement. However, barriers such as digital divides, data privacy concerns, and technical capacity gaps hindered full adoption of these technologies.

There is need for development of inclusive digital policies, strengthening technical capacity, and fostering community-driven digital campaigns. These measures can enhance digital literacy, bridge the digital divide, and maximize the potential of digital technologies in driving sustainable environmental practices. Future research should explore interdisciplinary collaborations and scalable technology-driven solutions for environmental conservation.

Keywords: *Social media platforms, digital technologies, environmental awareness, sustainability, Artificial Intelligence (AI), Internet of Things (IoT), big data analytics, Geographic Information Systems (GIS).*

USING A KNOWLEDGE CAFÉ APPROACH FOR KNOWLEDGE SHARING AND ITS IMPLICATION TOWARDS INNOVATION AND AGILITY

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Abstract

In the current age of information society, there is exponential growth in knowledge based economy. The pace of technological process is accelerating a cross various disciplines and networks making business models more complex. To navigate increasing uncertainty and the pace of change, institution and societies must adapt at knowledge management and continuous innovation through knowledge sharing. As knowledge creation and exchange become key factors of production instead of land, labour and capital, a fundamental shift is in how institution competes, collaborate and add value. Mastering knowledge management through knowledge sharing has profound implications for how institution must reinvent themselves however the big question remains; How will this knowledge be shared, is it through formal or informal gathering? This study seeks to draw the attention on informal method of knowledge sharing via knowledge café approach. A knowledge café brings people together informally to have an open discussion, conversation about an idea or issue of collective interest with the purpose of trying to discover the collective knowledge and deeper understanding of the concept. The knowledge café is a mindset and environment for engaging, discussing and exchanging knowledge within a group either face to face or virtually. At the café, participants can discuss hard to solve project issues that lead to innovation. To establish the role of knowledge café approach, innovation and agility; this study is guided by two research questions namely; What is knowledge café and its formation and What is the relationship between knowledge café, knowledge sharing and innovation? Qualitative research approach will be adopted with specific reference to content analysis. The discussion will be anchored from the secondary sources of information such as journal articles, thesis and conference papers. Literature searches will be conducted online using Scopus database and Google scholars; search terms include: Knowledge management; knowledge sharing; knowledge café; knowledge management and innovation; Benefits of knowledge café and innovation. Thereafter, results will be generated, analyzed and recommendation made on the study topic.

Keywords: *Knowledge, knowledge management, knowledge sharing, knowledge café, innovation*

UTILIZING DIGITAL TECHNOLOGIES TO ENHANCE INFORMATION ACCESS FOR LIFELONG LEARNING IN PUBLIC LIBRARIES IN NYERI COUNTY, KENYA.

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Abstract

Integration of digital technologies in public libraries was pivotal in enhancing information access and promoting lifelong learning, particularly in Nyeri County, Kenya. This study explored the role of digital technologies in public libraries, focusing on the following objectives; assessing the state of digital technology adoption in public libraries, identifying the barriers to effective digital service delivery, evaluating the impact of digital resources on community engagement and learning, and proposing strategies for improving digital literacy among library users. A mixed-methods approach was used, and data collected through surveys and interviews with library staff and users, supplemented by a review of existing literature on digital library services. Results indicated that while there was a growing presence of digital resources, significant challenges included inadequate infrastructure, limited digital literacy among users, and insufficient training for library staff. Results showed that enhanced access to digital resources positively influenced community engagement and learning outcomes. The study underscored the necessity for strategic investments in digital infrastructure and training programs to foster a culture of lifelong learning in Nyeri County's public libraries. This research shall contribute to the broader discourse on digital inclusion and the transformative potential of libraries in the digital age.

Keywords: *Utilizing digital technologies, information access, lifelong learning, public libraries, Nyeri County, Kenya.*

EFFECT OF INNOVATIVE CULTURE AND KNOWLEDGE MANAGEMENT IN THE ATTAINMENT OF ENVIRONMENTAL SUSTAINABILITY

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Abstract

The world continues to experience serious environmental degradation because of human activities that are carried out for subsistence and economic development. Human life is thus, dependent on natural resources whose poor management and utilization in turn threatens humanity and environmental sustainability. Different global forums held in the past to deliberate on the care of the environment have not averted the situation. The situation is worsened by need to feed the ever-increasing human population and the resultant over utilization of natural resources that has led to great decline of both biodiversity and ecosystem services across the globe. Human activities have led to massive destruction of forestland, extinction of species, land degradation, pollution, loss of biodiversity, and severe weather events, all of which have led to changes to climate consequently threatening human life. A lot of what has happened to the environment can be attributed to humans' failure to realize it's connection with the environment hence the need to examine how knowledge management can be used to avert this situation. This study will review existing literature to examine community's level of awareness on care of the environment, how knowledge management practices can be used to attain environmental sustainability, and the role of community innovative culture in averting environmental degradation. Results of the study will be used to draw conclusions and recommendations on how individuals, communities and organizations can benefit from available knowledge to reduce environmental degradation.

Keywords: *Environmental degradation, knowledge management, environmental sustainability, economic development, natural resources.*

REVOLUTIONIZING HEALTHCARE: THE ROLE OF DIGITAL HEALTH IN HEALTHCARE SERVICE DELIVERY

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Abstract

Digital health has rapidly changed service delivery enabling novel solutions to improve patient care and healthcare outcomes through addressing many challenges in traditional systems and offering new opportunities to improve patient care and outcomes. Digital health includes various tools, platforms, and technologies that enhance healthcare delivery, promote wellness, and improve health outcomes. Some of the applied technologies include telemedicine, wearable devices (like fitness trackers), mobile health apps, electronic health records (EHRs), AI-driven diagnostic tools, and health information systems. Telemedicine is one of the digital platforms that is boosting healthy care service delivery. Artificial intelligence technologies have also proven to be one area that improves medical diagnostics but it is in the early stages. Different studies have proven that AI can increase diagnostic accuracies and efficiencies with areas like machine learning, leading to better image processing and the capacity to identify new areas of biomarkers. Digital health enhances the quality of care and health outcomes boosting patient satisfaction. However, the integration of digital health in healthcare systems remains revolutionary. Privacy and confidentiality issues are key areas of concern. Because of the confidential nature of health data, systems security breaches can have detrimental impacts on service delivery. Data accuracy and reliability are additional concerns. This paper develops a conceptual model that provides a more detailed understanding of the relevance of digital technologies in healthcare. Some of the healthcare sectors that embrace digital technologies include health information, personal healthcare devices, diagnostic, surgery, pharmacy, and knowledge integration among others. This paper aims to examine how Kenyan health systems adapted to new technology and the role played in enhancing service delivery. The scope of the study will be a comparative study of a public health facility and a private health facility in Kenya.

Keywords: *Healthcare, digital health, telemedicine, artificial intelligence.*

FACTORS INFLUENCING DIGITAL PRESERVATION PRACTICES; A CASE OF KENYA NATIONAL ARCHIVES AND DOCUMENTATION SERVICE IN KENYA.

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Abstract

In the digital age, preservation of information has become a more complex task with many threats including technological obsolescence and deterioration of electronic storage media. Digitization is rapidly becoming one of the standard forms of preservation for libraries, archives and information centres' analogue materials. This newer process is allowing preservationists to ensure that the information contained within fragile, organic materials will still be available to future generations. If digitization for preservation is an investment in the creation of lasting digital products, then digital preservation is best viewed as the suite of tools, operations, standards, and policies that help ensure that this investment is not squandered. The study sought to evaluate the factors influencing digital preservation practices. The study employed use of a descriptive research design with a target population of 50 respondents including 10 Middle level managers and 40 operational managers at Kenya National Archives, Nairobi Office. The study involved all 50 employees as its sample size since the number was small and representation of all was required. Semi structured questionnaire was used to collect data from respondents. Data was analysed through descriptive and inferential statistics. Respondents agreed that information policy (mean = 4.20; std. dev. = 1.203) influenced digital preservation practice at KNADS. Respondents concurred that fund (mean = 4.10; std. dev. = .982) influenced digital preservation practice and emphatically agreed that available preservation technology (mean = 4.52; std. dev. = .640) influenced digital preservation practices at KNADS. The results of the correlation analysis revealed a positive moderate ($r = .378$; sig. value = .016) relationship between the factors that influence digital preservation practice and the contribution ease of use and access. Insufficient funding was established to be a major setback since digital preservation technologies required huge capital and human investment. Lack of information policy was cited as another impediment to digital preservation projects at KNADS.

Keywords: *Digital preservation, information, preservation practices, technologies, resource centre.*

SUSTAINABLE KNOWLEDGE MANAGEMENT PRACTICES, USER EXPERIENCES FOR INNOVATION AND AGILITY

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Abstract

Sustainable knowledge management (KM) practices and user-centered design principles in KM systems are pivotal for fostering organizational innovation and agility. This study investigates the relationship between User Experience (UX): UX, knowledge management (KM) strategies, and the organization's AI and block chain applications to improve storage, sharing, and applicability of knowledge known. Substantial research has been done on identifying the importance of KM techniques. However, not much value has been given to UX and its contribution to innovation and engagement of employees. This study employed a qualitative research design using semi-structured interviews and focus group discussions with the Key Material Officers (KMOs), Information Technology (IT) managers, and employees from Kenyan organizations. Data was examined and coded manually and with assistance of NVivo software to give a thematic pattern on the aspects of usability of UX and business agility of digital KM. Companies with a KM system that is friendly to UX improvements had 40% increase in efficiency of retrieving knowledge and an uplift of innovation. Notably, however key barriers included low digital literacy of employees, reluctance to accept and implement new KM systems, and high costs of implementation. The study makes a theoretical contribution by establishing that UX-enhanced KM systems are aligned with the Knowledge-Based Theory and Dynamic Capabilities Theory. In practice, it emphasizes the need for companies to adopt AI-based functionalities into KM and effectively handle barriers by pursuing enhancement of appropriate digital literacy among users and proper policy changes. It thus ensures that the application of UX-driven KM practices improves not only knowledge conversion and transfer but also the organization's adaptability and creativity. More research should be conducted to identify suitable KM models for SMEs and assessment of the long-term economic effects in various cultures when utilizing AI in KM solutions.

Keywords: *Sustainable knowledge management practices, user experiences, innovation, agility.*

PERSPECTIVES OF LIBRARIANS ON AWARENESS AND READINESS ON INTEGRATION OF ARTIFICIAL INTELLIGENCE FOR LIBRARY OPERATIONS AND SERVICES IN SELECTED UNIVERSITY LIBRARIES IN KENYA

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Abstract

With the evolving technologies, library users have continuously used technological tools, techniques and platforms to search for information based on their diverse needs. The users are confidently adopting the emerging technologies in their studies, research and learning. Librarians in universities have immensely been instrumental in assisting library users to access and use relevant information resources because they are trained in information Capture, Storage, Use, archival and disposal. University Libraries are thus heavily investing in user support automation software, systems, applications to enable their diverse users with an intention to fully satisfy their needs in this electronic environment. Integration of artificial intelligence (AI) technologies has garnered significant attention across various sectors, including libraries, for its potential to enhance efficiency, accessibility, user experiences, and the Gen Z users who are techno savvy, techno inquisitive with ability to use and navigate technology, signifies that there will be a paradigm shift in defining roles of librarians. The study used a survey research design to collect views and opinions of respondents. The target population was users 35 in Public accredited Universities and 25 private accredited Universities. A sample of 362 students from 47 public Universities participated in the study. Data was collected using questionnaires and participant-observation and analyzed using descriptive and hierarchical linear methods for quantitative and qualitative data respectively. Data was presented using descriptive statistics such as frequencies and percentages. Results will highlight awareness and readiness to integration of artificial intelligence in library operations and services in selected university libraries.

Keywords: *Librarians, awareness and readiness, integration, artificial intelligence, library operations and services, university libraries, Kenya.*

EXPLORING THE ROLE OF UNIVERSITY LIBRARIES IN DIGITAL PRESERVATION ADVOCACY: A CASE STUDY OF SELECTED KENYAN INSTITUTIONS

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Abstract

The digital revolution has significantly transformed the way academic institutions create, store, access, and share information, necessitating a shift in university libraries from traditional print collections to digital formats. This study investigated the role of university libraries in digital preservation advocacy within selected Kenyan institutions, with objectives focused on assessing current digital preservation practices, strategies for promoting awareness, and the impact of advocacy efforts on preserving digital resources. Employing a mixed-methods approach, the study used structured surveys administered to 75 library staff, including university librarians, acquisition librarians, and system librarians, to collect quantitative data on policies, technological infrastructure, resource allocation, and advocacy activities. Qualitative data was gathered using Key Informant Interviews (KIIs) with selected librarians, following a semi-structured format to explore policies, infrastructure, staffing, advocacy efforts, and challenges. Results showed a varied landscape in digital preservation efforts, with 30% of respondents acknowledging strong preservation strategies, while inconsistencies in implementation persist. While 36% of respondents agree on the presence of systematic evaluation frameworks, gaps remain in their effectiveness. Institutions prioritize the preservation of digital resources such as research publications and institutional records, with 28% strongly agreeing on this aspect. Confidence in digital preservation tools is notable, with 40% approval, yet long-term sustainability strategies remain inconsistent. Universities employ various preservation methods, including cloud storage, institutional repositories, metadata tracking, and fixity checks, but the need for standardized policies and advanced technologies is critical. Advocacy efforts have influenced digital preservation strategies by shaping policies, increasing awareness, and enhancing resource preservation, with 34% of respondents acknowledging their impact on policy formulation and 28% recognizing increased awareness among staff and faculty. Despite measurable improvements, challenges such as funding limitations, resistance to change, and legal concerns hinder sustainability. Institutional support and funding have grown due to advocacy, yet overcoming persistent barriers remains crucial for the continued success of digital preservation initiatives. There is need for development of standardized policies to ensure consistency across institutions, investment in advanced preservation technologies, expansion of training programs, faculty engagement initiatives, and implementation of systematic evaluation frameworks to guide improvements.

Keywords: *Digital preservation, university libraries, advocacy, technological infrastructure, institutional repositories.*

ENHANCED RESEARCH SKILLS COMPETENCY AND INFORMATION LITERACY TRAINING AMONG POST GRADUATE STUDENTS IN SELECTED KENYAN UNIVERSITIES

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Abstract

Despite the increasing availability of digital research tools and scholarly databases, postgraduate students in Kenyan universities continue to struggle with information retrieval, critical evaluation of sources, referencing, and academic writing. These challenges hinder their ability to produce high-quality theses and dissertations, negatively impacting their academic confidence and research productivity. The primary objective of this study was to assess the current level of research competency among postgraduate students in selected Kenyan universities. The study used a descriptive research design and targeted postgraduate students from four Kenyan universities: Embu University, Kirinyaga University, Murang'a University, and Karatina University. The target population consisted of 400 postgraduate students, with a sample size of 120 students selected using simple random sampling. All four university librarians were interviewed for insights into academic resource availability. Data was collected using semi-structured questionnaires and analysis done using descriptive and inferential statistics. Results showed that postgraduate students exhibited moderate research competencies. Respondents showed confidence in identifying appropriate research methods (mean = 3.35; std. dev. = 1.28), analyzing data (mean = 3.40; std. dev. = 1.26), and utilizing academic databases (mean = 3.42; std. dev. = 1.27). However, they expressed lower confidence in writing research proposals (mean = 3.39; std. dev. = 1.29). Training in research skills was found to positively impact students' research efficiency (mean = 3.35; std. dev. = 1.28) and critical thinking abilities (mean = 3.41; std. dev. = 1.27). Barriers such as limited access to academic resources (mean = 3.38; std. dev. = 1.30), time management challenges (mean = 3.40; std. dev. = 1.28), and inadequate supervisor feedback (mean = 3.37; std. dev. = 1.29) were significant. Interviews with librarians revealed difficulties like outdated materials and poor internet infrastructure. Results showed that while postgraduate students in selected Kenyan universities possess moderate research competencies, gaps exist in research proposal writing and data interpretation. There is need for universities to enhance research training programs, improve library resources, and upgrade internet infrastructure to support postgraduate research efforts.

Keywords: *Postgraduate students, research competencies, information literacy and research skills.*

ROLE OF LIBRARIANS IN GUIDING USERS THROUGH AI-POWERED TOOLS AND RESOURCES

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Abstract

The rapid integration of artificial intelligence (AI) in digital tools is reshaping the information landscape, creating new opportunities for knowledge access and discovery. Despite these advancements, users often face challenges in utilizing AI-powered tools effectively due to their complexity and evolving nature. This study investigates the role of librarians in guiding users through AI-powered tools and resources, addressing their contributions, strategies, and obstacles encountered. The study sought to identify best practices for empowering users and promoting digital literacy. The study employed a mixed-methods research design, combining qualitative interviews with librarians from academic, public, and specialized libraries and a quantitative survey of library users. The target population included librarians and library users, with a sample size of 150 respondents selected through purposive and stratified sampling techniques. Data collection instruments comprised structured interviews and questionnaires. The validity and reliability of the instruments were ensured through expert review and a pilot study, achieving a Cronbach's alpha coefficient of 0.85. Data was analyzed using thematic analysis for qualitative responses and descriptive statistics for quantitative data. Results revealed that librarian-led interventions, such as workshops, one-on-one consultations, and digital resource guides, significantly improved user understanding and confidence in using AI tools, including chatbots and automated research assistants. Challenges identified included limited professional development opportunities for librarians and users' skepticism towards AI tools. There is need for increased investment in professional development programs for librarians to strengthen their AI competencies. Additionally, there is need for user-centered approaches such as personalized training sessions and feedback mechanisms to address user concerns and enhance digital literacy. These initiatives would enable librarians to effectively guide users in the evolving AI landscape, fostering informed and ethical use of AI-powered tools

Keywords: *Librarians, guiding users, AI-powered tools and resources.*

SUSTAINABLE KNOWLEDGE MANAGEMENT PRACTICES: USER EXPERIENCE FOR INNOVATION AND AGILITY

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Abstract

Knowledge management (KM) systems are crucial for creating, transferring, and applying organizational knowledge. However, many KM systems fall short of delivering sustainable value, resulting in low-quality and limited knowledge bases. User experience, innovation, and organizational agility have driven research into integrating sustainable KM practices with a focus on addressing organizational information needs. This study aimed to assess sustainable KM practices and their impact on user experience, innovation, and agility. The objectives were to examine KM practices, evaluate user experience, and analyze the relationship between KM and organizational agility. Despite advancements in KM systems, many organizations struggle with knowledge retention, system agility, and user experience, hindering innovation and long-term sustainability. The study focused on knowledge users within the East African Community (EAC) Secretariat. A purposive sampling technique was employed, targeting 200 email analysts as respondents. Data was collected using structured questionnaires and system observation checklists. The instruments were validated through expert review and a pilot test, achieving a reliability coefficient of 0.85 using Cronbach's alpha. Quantitative data was analyzed using descriptive and inferential statistics, including frequency counts and correlation analysis. Qualitative data was thematically analyzed to identify patterns and insights. The study revealed that 30% of emails (60 out of 200) had disappeared from the system, indicating gaps in KM processes. There is need for robust KM practices to support knowledge retention, user experience, and innovation as well as regular system reviews, enhanced security protocols, and user training to improve KM effectiveness. There is also need for organizations to adopt agile KM frameworks to foster innovation and knowledge sustainability.

Keywords: *Sustainable knowledge management practices, user experience; innovation, agility.*

INFLUENCE OF PERSONAL RESPONSIBILITIES ON PERFORMANCE OF UNIVERSITY LIBRARY STAFF IN MERU COUNTY

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Abstract

This study investigated how personal responsibilities influence performance of university library staff in Meru County. Effective job performance requires staff to balance their professional obligations with personal duties to minimize workplace disruptions. The study assessed the extent to which personal responsibilities affect performance, guided by the border theory. It employed a descriptive research design, targeting thirty-eight staff members from four universities in Meru County. Census sampling was used, with questionnaires as the primary data collection instrument. A pretest conducted at Chuka University Library ensured validity and reliability of the research instruments. Quantitative data was analyzed using descriptive and inferential statistics with SPSS and qualitative data analyzed thematically. The normality test results showed all probability values above 0.05, indicating a normal distribution. Additionally, the test statistic value of 2.182 confirmed no autocorrelation violations. Pearson Product Moment Correlation analysis revealed a positive correlation between personal responsibilities and work performance. Multiple linear regression analysis indicated that the model was statistically significant in predicting the influence of personal responsibilities on performance. It was observed that personal responsibilities significantly impacted the performance of university library staff in Meru County. These findings contribute to existing knowledge and provide valuable insights for university management in balancing staff personal duties with work productivity. There is need for university libraries to adopt flexible work policies and provide support programs to enhance staff productivity. Further research is suggested to explore additional factors affecting library staff performance and to propose interventions for managing work-life balance effectively.

Keywords: *Personal responsibilities, performance, staff, university libraries.*

INFLUENCE OF KNOWLEDGE MANAGEMENT ON INNOVATION AND COMPETITIVENESS IN HIGHER LEARNING INSTITUTIONS IN KENYA

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Abstract

This study investigated how knowledge management (KM) influences innovation and competitiveness in higher learning institutions (HLIs) in Kenya. The problem addressed is the limited understanding of how KM practices drive innovation and competitiveness within HLIs. The study aimed to examine the relationship between KM practices, user experiences (UX), and institutional competitiveness. The objectives were to analyze existing KM practices and UX in HLIs, assess KM practices that foster innovation and competitiveness, and explore the impact of innovation and competitiveness on sustainable KM practices and UX among HLIs' faculty and staff. A mixed-methods research design was employed. The target population included senior managers from four universities: two public (Kibabii and Kirinyaga) and two private Universities (Mount Kenya and Baraton). A purposive sampling technique was used to select 16 senior managers (four from each university). Data was collected using interviews and document analysis. Validation and reliability were ensured through expert review and pilot testing. Thematic analysis was used for qualitative data, while descriptive statistics summarized quantitative findings. The study revealed that effective KM practices, such as knowledge sharing platforms and digital repositories, significantly enhance innovation and competitiveness. It also highlighted gaps in user experience, which, if addressed, could further strengthen KM outcomes. The findings imply that strategic KM initiatives can drive sustainable competitiveness and innovation in HLIs. There is need for university administrators to implement robust KM frameworks and continuous staff training to foster a culture of innovation and agility.

Keywords: *Knowledge management (KM), higher learning institutions (HLIs), user experience (UX), innovation, competitiveness.*

SUSTAINABLE REFERENCE SERVICES AND USER EXPERIENCE FOR CREATIVITY AND ADAPTABILITY

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Abstract

During the COVID-19 crisis, libraries showed great resilience in providing fair access to information, knowledge, and community support. When libraries had to close due to the pandemic, users faced challenges in accessing services. Like other service sectors, libraries adapted by using technology, such as Zoom videos and LibChats, to stay connected with users. Technological advancements have changed reference services in academic libraries, raising user expectations. Before and after the COVID-19 pandemic, libraries shifted from traditional in-person assistance to online reference services. This study investigated through systematic review modern reference services, focusing on user experience and the quality of services provided in academic libraries. The study explored accessible and sustainable reference services that meet users' current information needs, identifying innovative ways to improve these services, and examined the challenges academic libraries experience in providing reference services in modern times. Results showed that users received improved services because virtual communication allows them to access information more quickly. It was also observed that libraries have invested in technology to improve provision of reference services. However, academic libraries face challenges such as limited funding and the need for training for both staff and users to improve reference services and user experience. Among the recommendations are marketing the new products of the Library virtually and investing in the latest technologies that are useful to Library staff and users.

Keywords: *Technology, zoom, libchats, covid 19 pandemic, reference.*

ADOPTION OF RESOURCE DESCRIPTION AND ACCESS (RDA) STANDARDS IN SELECTED UNIVERSITY LIBRARIES IN KENYA

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Abstract

Resource Description and Access (RDA) is a successor of the Anglo-American Cataloguing Rules 2nd edition and is designed to facilitate description and access of information resources in libraries. With the increasing availability of digital resources, adoption of RDA standards has become essential for libraries to provide effective access to information. This study investigated the current state of RDA adoption in University Libraries in Kenya and the factors that influence its adoption and implementation. The study was anchored on Technology Determinant Theory. Descriptive research design was used, targeting 27 respondents from 3 selected university libraries in Kenya who included two library administrators and 25 library staff. Questionnaire was the main instrument of data collection and the final data collected was presented using illustrations. Based on the findings the study, it was observed that while there is a foundational awareness and understanding of RDA standards among library staff, significant barriers to full implementation persisted. These barriers primarily included inadequate training, resource constraints, and resistance to change. Results of this study are expected to provide valuable insights for policymakers, library professionals, and stakeholders in the academic community, aiming to enhance adoption and implementation of RDA standards in university libraries in Kenya.

Keywords: *Adoption, resource description and access (RDA) standards, university libraries, kenya.*

LEVERAGING SUSTAINABLE KNOWLEDGE MANAGEMENT PRACTICES AND USER EXPERIENCES TO ENHANCE INNOVATION AND AGILITY IN POULTRY FARMING IN KENYA.

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Abstract

Poultry farming is a significant contributor to food security, job creation, and economic growth in Kenya. Poultry farming is, however, faced with challenges such as climate change, disease outbreaks, and market volatility that demand creative and rapid responses. This paper is based on a study; 'Leveraging Sustainable Knowledge Management Practices and User Experiences to Enhance Innovation and Agility in Poultry Farming in Kenya'. Socialization, Externalization, Combination, Internalization (SECI) and Knowledge-Based View (KBV) theories were used to examine the study objectives which were; to assess the current knowledge management practices among poultry farmers in Kenya; to explore the impact of user experiences on innovation and agility in poultry farming; to explore the impact of sustainable knowledge management tools and strategies on poultry farming in Kenya and to provide actionable recommendations to stakeholders in poultry farming in Kenya. A mixed-methods research design was used to collect data from poultry farmers, agricultural extension officers, and industry stakeholders in Kenya. Qualitative focus group discussions and interviews were conducted to understand user experience, issues, and knowledge exchange. Quantitative surveys were used to quantify the use of KM tools, technological innovation, and their impacts on farm productivity and adaptability. The findings indicate that effective KM practices such as electronic media for knowledge sharing, learning communities and local documentation of knowledge significantly enhance the ability of farmers to innovate and respond to dynamic challenges. The study concluded that, in order to facilitate sustainable KM practices, the co-creation of knowledge alongside farmers to contextualize solutions and make them user-centric and the utilization of technology, such as mobile applications and IoT-based monitoring systems, to facilitate real-time data sharing and decision-making are essential.

Keywords: *Sustainable knowledge management, user experiences, innovation, agility, poultry farming, Kenya.*

AI-DRIVEN INFORMATION SERVICES: ARE KENYAN UNIVERSITY LIBRARIES READY?

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Abstract

Artificial Intelligence (AI) presents substantial opportunities to advance library services and user experiences in university libraries. However, despite the growing global adoption of AI in university libraries, Kenyan university libraries face challenges that hinder AI-driven innovation, affecting service delivery and user satisfaction. This study aims to assess the readiness of university libraries in Kenya for AI adoption by examining key enablers and barriers. A systematic review of peer-reviewed literature, conference papers, and repositories from 2015 to 2025 was conducted, focusing on AI adoption in university libraries globally and in Kenya. Themes were identified through thematic analysis, ensuring a comprehensive understanding of AI readiness. The study established that university libraries in Kenya have poor ICT infrastructure, the library staff lack AI specific skills needed to provide AI enhanced services, users have mixed perceptions about the use of AI in libraries and there is lack of a framework for adoption of AI in university libraries in Kenya. These challenges are common across many university libraries and prevent AI from being seamlessly integrated into library operations. The study also found inadequate funding, resistance to change and ethical and privacy concerns about AI as the challenges university libraries in Kenya face in adoption of AI. The findings suggest that while challenges persist, the interest in AI adoption provides an opportunity for policymakers and universities to drive digital transformation in library services. The study recommends that the Ministry of Education, university administrations, and library associations collaborate to enhance AI adoption through funding, policy formulation, and capacity building. This study provides a first-of-its-kind systematic review of AI readiness in Kenyan university libraries, offering a framework for guiding policy and practice in AI-driven library innovation.

Keywords: *Artificial intelligence (AI), university libraries, AI readiness in libraries, AI integration in libraries, emerging technologies in libraries, AI-driven library innovation, digital transformation.*

REINVENTING ACADEMIC LIBRARIES IN THE ERA OF EDTECH: NAVIGATING CHANGE AND EMBRACING INNOVATION

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Abstract

Academic libraries have always been at the centre of higher education through the provision of information resources for supporting learning, research and innovation. Traditionally, academic libraries have offered physical resources to meet the information needs of the students, faculty and researchers. However, in the age of EdTech, there have been tremendous changes in how information is accessed and used, hence the need for academic libraries to adjust to new realities. This paper evaluates how EdTech has affected academic libraries and how their roles have transformed in the EdTech age. Through a systematic literature review, the paper examines the impact of EdTech on academic libraries, their evolving roles, strategies for maintaining relevance in the EdTech era, and the associated challenges and opportunities. Through a qualitative synthesis of literature from various electronic databases, reports and repositories on EdTech and the integration of EdTech in academic libraries, dominant themes were identified and discussed accordingly. The study established that the EdTech era has impacted academic libraries through change in user expectations, evolution of collections, emergence of new models of learning, competition from third-party information providers and evolution of new roles. The study also found that the EdTech era has transformed academic libraries to digital resource curators, innovation hubs, and advocates for Research Data Management (RDM), equity and inclusion. To thrive in this era, academic libraries should pursue strategies such as collaboration with faculty, staff upskilling, using emergent technologies, and improving user experience. The paper concludes that academic libraries must adapt to the changing technological landscape and actively shape how EdTech is integrated into higher education to remain indispensably important to the educational process. The findings of this study are crucial in ensuring that academic libraries maintain their relevance in their mission of supporting teaching, learning, and research in the EdTech era.

Keywords: *Academic libraries, educational technology integration, EdTech, digital transformation, evolving library roles*

SUBTHEME: EDUCATION FOR SOCIETAL DEVELOPMENT**INFLUENCE OF TEACHER-LEARNER PSYCHOSOCIAL DYNAMICS ON MENTAL WELLNESS AMONG SECONDARY SCHOOL EDUCATORS IN MATHIRA SUB-COUNTY, KENYA**¹Gitumu M.W., ¹Njoka J.N., ²Githui P.¹ Karatina University, KENYA²Taita Taveta University, KENYACorrespondence: jnjoka@karu.ac.ke**Abstract**

The extent of the influence of learners' mental health on teachers' mental wellness is not clearly documented. The purpose of this study was to examine whether teacher-student psychosocial dynamics affect the mental wellness of secondary school educators in Mathira Sub-County in Kenya. The study explored the prevalence of student-related factors that influence teachers' mental wellness, analyzed mental wellness among teachers by gender and made recommendations on how to promote teacher resilience and mental wellness. The study adopted the survey research design. The target population was 500 teachers from 43 schools. A sample was selected using the Kathuri and Pals Formula that yielded 217 respondents. A questionnaire containing the Warwick-Edinburgh Mental Well-being Scale (WEMWBS) for measuring mental wellness was used. Data was analyzed using descriptive and inferential statistics using Statistical Package for Social Sciences (SPSS) Version 25.0. R-Square of 0.076 was obtained implying only 7.6% of the variance in teachers' mental wellness is explained by the mental well-being of the learners. Regression analysis revealed that the relationship between teachers' mental wellness and the learners' mental well-being was not statistically significant ($p=0.130$). This implies that whereas teachers help learners manage their mental health issues, they do so just as a job devoid of empathetic relationships. There is compelling and urgent need to re-look the teacher training curriculum to enable teachers provide support to learners with empathy and restore the nobility of the profession.

Keywords: *Student mental health, teacher mental wellness, psychosocial dynamics.*

IMPEDIMENTS OF PARENTAL INVOLVEMENT IN THE IMPLEMENTATION OF COMPETENCY BASED CURRICULUM IN KENYA

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Abstract

Parental involvement is essential in the implementation of Competency-Based Curriculum (CBC) in Kenya. One of the aims of CBC is to ensure that every learner's potential is nurtured with the help of all stakeholders especially the parents. While CBC emphasizes active parental participation for successful learner outcomes, its implementation has faced challenges in achieving this ideal. This paper explores the factors limiting effective parental involvement in implementation of Competency Based Curriculum (CBC) in Kenya. The study is founded on Epstein's Theory of parental involvement. This theory examines parental involvement in six facets. The study adopted a qualitative research design using document analysis. Data was analysed using document analysis. This approach involved reading articles, books and online sources to provide insights into factors impeding effective parental involvement in implementation of CBC in Kenya. Results showed that many parents struggled with the perceived complexity of CBC and the shift in assessment methods. Limited access to resources, including technological tools and supplementary learning materials, also emerged as a significant barrier. Socioeconomic factors, such as parents' level of education and work schedules played a role in limiting their capacity to engage with their children's learning. At the same time, the research explored the communication channels between schools and parents, and identified areas for improvement in fostering stronger partnerships. There is need for targeted interventions to address these challenges and empower parents to effectively support their children in the CBC system. There is need for intervention of policymakers, schools, and other stakeholders to advance strategies focused on enhancing parental involvement to ensure successful implementation of the CBC in Kenya.

Keywords: *Competency based curriculum, impediments, implementation, parental involvement.*

CRAFTING RESILIENT NARRATIVES: THE FUSION OF INFORMATION DESIGN, SUSTAINABILITY, AND CULTURAL IDENTITY

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Abstract

Information design, sustainability, and cultural expression are interlinked domains that shape how knowledge is communicated and applied in addressing global challenges. This research explores how effective information design can support sustainability while respecting cultural identities, specifically focusing on the Agiryama cultural identity. Information design aims for clarity, accessibility, and engagement, presenting complex data in an understandable way. When integrated with sustainability, it ensures solutions minimize environmental impact and promote resource efficiency. The Agiryama people, part of the Mijikenda community along the Kenya coast, have a rich cultural heritage expressed through language, symbols, and traditions. This study whose objectives are: -Assessing the integration of Agiryama cultural elements in information design, quantifying the environmental impact of sustainable information design solutions and evaluating community engagement and empowerment through participatory design approaches, highlights the role of cultural identity in design, ensuring outputs resonate with the community. By incorporating Agiryama motifs, oral narratives, and traditional knowledge, the research shows how cultural expression can enhance relevance and foster ownership. Through interviews and questionnaires, the study examines initiatives such as culturally grounded infographics for environmental conservation, digital storytelling to preserve Agiryama oral histories, and participatory design workshops blending traditional and modern knowledge. The research emphasizes the importance of designing information systems that are environmentally responsible, inclusive, and culturally resonant. Challenges such as balancing modernization with cultural preservation, addressing digital divides, and overcoming resource constraints are also explored. The findings highlight the significance of collaborative approaches that involve local communities as co-creators, ensuring authenticity and inclusivity. This study frames the fusion of information design, sustainability, and cultural identity as a practical pathway to creating solutions that are environmentally responsible, technologically innovative, and culturally enriching. By focusing on the Agiryama context, the research contributes to broader discussions about preserving heritage while driving sustainable progress.

Keywords: *Cultural expressions, information design, environmental conservation, sustainability.*

MAPPING THE IMPACT OF LIFELONG LEARNING SKILLS AND TRANSFORMATION OF THE WORLD OF WORK FOR THE CHIEFS WORKING IN MACHAKOS COUNTY, KENYA

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Abstract

This paper attempts to map out the impact of lifelong learning skills in transforming the world of work for chiefs working in Machakos County, Kenya. Currently, the workplace has significantly shifted. Thus, more than ever before, workers are faced with new challenges and demands that call for more creativity, critical thinking and innovation. Since the world of work ecosystem has been greatly impacted by technological innovation, workers need more cutting-edge lifelong learning skills in order to adapt in the new challenges and changes in the workplace. Workers are currently experiencing a fast-paced and vastly changing workplace such that yesterday's skills, techniques and approaches are no longer relevant. Simply put, they need to go beyond their job description in order to thrive and succeed in the workplace. Accessing new skills, knowledge, and competencies is critical for workers' performance, productivity, and professional development. This paper attempted to map out the impact of lifelong learning skills in transforming the world of work for the chiefs working in Machakos County, Kenya. This is a descriptive study. Data was collected using a standardized questionnaire. The target population was the Chiefs working in Machakos County, Kenya.

Keywords: *Work-place, live-long learning, skills, impact, transformation, critical-thinking.*

LEVEL OF COMPETENCE ON DIGITAL LITERACY SKILLS IN JUNIOR SECONDARY SCHOOLS, KENYA

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Abstract

Digital literacy (DL) in competency-based curriculum (CBC) is a 21st century skill. It is a social shift from information to knowledge society. Digital Literacy (DL) is a critical and relevant skill in the CBC as it allows individuals to participate, contribute and function fully in the society. This paper investigated the extent to which students are digitally competent, the challenges faced on use of digital tools, status of ICT resources and measures taken by stakeholders to ensure learners are digitally competent. The connectivism theory which holds that students should learn how to combine thoughts, theory and information in a useful way informed the study. The research is founded on constructivist and social- culture paradigm. The study adopted mixed methods using descriptive survey approach. Simple random sampling procedure was used to select schools. Data collection instruments were questionnaire, interview and observation schedules. Data was analyzed using descriptive statistics. Results showed that students have insufficient digital skills, they seek a lot of help when using digital tools, that they use communication tools at home but not in school, that teachers lack digital skills, that there is inadequate ICT resources in schools, and that no measures are being taken by stakeholders to achieve digital competence. These findings will create awareness on the need for digital literacy competence among students. It is recommended that digital literacy be integrated in teacher education and that ICT infrastructure be improved in schools.

Keywords: *Digital literacy, competence, competency based curriculum, 21st century skills.*

EDUCATION TECHNOLOGY IS NOT A LUXURY IN THE 21ST CENTURY, IT IS A NECESSITY

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Abstract

Educational technology is no longer a luxury, but an important component of the 21st-century education system. Modern societies have hinged their socio-political and economic development on technology. This has made the use of technology indispensable in the teaching and learning process. It has thus become imperative that teachers and learners have full access to the necessary educational technology to realize teaching and learning objectives. Technology helps bridge the gap in access to quality education, making learning more inclusive and effective. Many African countries, including Rwanda, are investing in educational technology to modernize their education systems and align their manpower development to the economic demands of their societies. However, the question is to what extent is educational technology being employed by teachers in the classroom. This research investigated the extent to which teachers in Rwandan Teacher Training Colleges are using educational technology in the teaching and learning process. Qualitative research through desk research, interviews and the researcher's experiences were used to obtain results. The overarching conclusion revealed the necessity of technology education in Rwanda and the rest of the world.

Keywords: *Education technology, luxury, inclusive, necessity socio-political development, economic development, indispensable.*

TEACHERS LIFELONG LEARNING BEHAVIOURS AND DIGITAL LITERACY: A LITERATURE SYNTHESIS

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Abstract

Effective integration of technology in the teaching and learning activities in secondary schools is a reflection of the learning capacities and experiences by teachers from previous learning. This paper explores the effect of teachers' lifelong learning behaviours and achievement of digital literacy. Specifically, the study examined teachers' views on lifelong learning, the benefits of lifelong learning and digital literacy on integration of technology in teaching and learning in secondary schools. The study systematically reviews secondary literature to evaluate teachers' lifelong learning behaviours and its influence on their acquisition of digital literacy skills. Approximately 20 research articles met the criteria for inclusion in the study. Analysis of the observations from empirical studies have shown that lifelong learning by teachers is critical to ensuring instructional effectiveness. Findings from developing countries have shown that most teachers find themselves far behind in terms of digital literacy which affects the integration of technology in teaching and learning activities in secondary schools. There is a positive effect of teachers' lifelong learning behaviours to digital literacy levels and integration of technology in classroom instruction in secondary schools. It is therefore concluded that teachers' digital literacy competencies levels are dependent on their lifelong learning behaviours. It is recommended that teachers should embrace lifelong learning through acquisition of digital literacy skills which is key to integrating technology in their instructional processes in schools. Additionally, the government should ensure that secondary schools are provided with ICT infrastructure and facilities to enable teachers with lifelong skills to integrate them in their teaching and learning processes. The ministry of Education needs also to develop and promote lifelong learning policies to enable teachers reposition themselves with the changing demands in the education sector and realities of the present world.

Keywords: *Digital, literacy, lifelong, learning, teachers and behaviours.*

MEDIA DIPLOMACY AT STAKE: THE TORTUROUS JOURNEY OF THE MEDIA REGULATORY FRAMEWORK IN KENYA FROM THE COLONIAL ERA TO THE PUBLIC DIPLOMACY ERA

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Abstract

The historical body of written works point out that the early years of colonization in Kenya represented a ruthless and effective form of manipulation and control by a small group of powerful individuals. This group is understood to have had a firm grip on its subjugation, and they succeeded in making local communities in Kenya accept their established system of authority. In ensuring that they successfully maintained this system of authority, this small and powerful group employed a thin administration that mainly consisted of its minority population. This administration worked towards establishing a loyal and more secure dominion founded on its people's tradition and western civilization. They pursued their interests and had no interest in understanding the African culture. This small group became the only media owners during the country's early years of colonization. They mainly comprised of immigrants, missionaries, and colonial masters. This research involved studying of secondary data to understand the historical trends and interviewing media personnels to highlight the current picture of media freedom struggle. It showed that the earliest forms of mass media mainly targeted the two most influential groups of people. The first one was the white elites who lived in Kenya and England. The second group included a small number of people of the South Asian ancestry who lived in Kenya. The study shows how this historical influence has trickled down to the present day. Kenya is grappling with threats which have existed since the colonial period. These obstacles are in various forms such as external interference. Another challenge for the media that emerges in this review is the low levels of journalistic professionalism, which has also remained consistent through the entire period of media's existence in Kenya. The level of journalistic professionalism seems to be at its lowest in many media platforms today. The Kenyan media industry is highly market-driven and as such, media platforms have to deal with the immense commercial pressure that, in some instances, tends to threaten their editorial independence. The role of social media towards media freedom cannot be ignored. The future progress of the Kenyan media cannot be guaranteed if the current environment in which it operates remains the same. For this reason, the continued commitment of media practitioners and civil society organizations in agitating for independence of media through strict enforcement of the existing legislative frameworks will be needed to ensure this sector's progress.

Keywords: *Media diplomacy, public diplomacy, legal policy, regulatory framework.*

THE EFFECT OF THE USE OF CHATGPT ON TEACHING AND LEARNING IN UNIVERSITIES IN KENYA.

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Abstract

Teaching and learning in the 21st Century is changing rapidly due the advancement of technology. The advancement on Machine learning has led to creation of more sophisticated innovative technology known as Generative Artificial Intelligence- AI. Generative Pre-trained Transformer (GPT) under which ChatGPT falls uses “large amount of publicly available digital content data (natural language processing [NLP]) to read and produce human-like text in several languages. It can exhibit creativity in writing from a simple paragraph to a full research article on almost any topic. This application has ability to perform complex tasks including generating essays for students. ChatGPT was released to the public in November 2022 and it quickly attracted many subscribers including students. The abilities of ChatGPT to perform complex tasks within the field of education is causing mixed reactions among educators and researchers in universities. It is likely to change the way teaching and learning occurs especially assessment of students’ work. This paper reviews literature on the use of ChatGPT in universities. The paper starts with a definition of ChatGPT and goes on to examine ways in which students and faculty use it to support teaching and learning. The effects of the use of ChatGPT on teaching and learning in universities are analyzed with a view to making suggestions on the how it can be used to support and improve teaching and learning.

Keywords: *Artificial intelligence, ChatGPT, teaching and learning, universities.*

PERSONALITY AND PSYCHOPATHOLOGY AND ACADEMIC ACHIEVEMENT OF UNIVERSITY STUDENTS IN KENYA

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Abstract

University students represent the national capital and investment for the future, with an implicit mission both for their families and for society succeed, competition with peers and in some countries financial burden and concerns about the future. As all this may lead to psychopathology, the health of university students has been the subject of increasing focus in recent years. Multiple protective and risk factors are involved in the psychological well-being and distress of university students. Specific risk factors for the development of psychopathology are high test anxiety, lower self-efficacy, as well as certain personality traits. Moreover, some students arrive at college with already existing mental health problems. The most frequent mental disorders among students are substance abuse, depression, self-harm and suicide, eating and anxiety disorders. Acquiring and improving knowledge about the student population is a crucial factor in the development of mental health promotion programs in order to meet their needs and to help them cope with various problems. Better understanding and care of the personality profile of university students can be helpful in academic and career choice and prevention of future mental health problems.

Keywords: *Personality, psychopathology, university students, depression, mental health.*

WHAT'S IN A NAME? AN ONOMASTIC DELVE INTO POLITICS OF NICKNAMES IN KENYA.

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Abstract

Names and natural kind terms have long been a major focus of debate about meaning and reference. In the field of linguistics, onomastics deals with the study of proper names, especially the names of people and places. Over the years, the Kenyan political space has changed, thanks to social media, with Kenyans on X, Tiktok and other digital platforms playing a key role in shaping the country's political discourse. One of the new traits that has emerged is the use of political nicknames. This study investigated on the origin and meaning of nicknames used to refer to popular politicians in Kenya. Ten popular political leaders in Kenya from different regions were sampled and a list of their political nicknames generated. Thereafter, qualitative analysis was done through questions and focused group discussions among third year students of linguistics at Kirinyaga University on what the names connote. The study adopts the associative theory of meaning which refers to the additional, subjective associations and emotions that a word carries beyond its literal description. From the study, it was evident that the nicknames of various politicians in Kenya vary greatly from one another. Unlike people's names that are denotative and do not indicate or imply any attributes as belonging to those individuals that answer such names, the nicknames are used to identify the politicians' characteristics focusing on their speech, behaviours, leadership traits, political choices and personal habits. Both names and nicknames play a role in shaping politicians' identity and how they are perceived by others. Indeed, this study reveals that nicknames are significant to both bearers and users, and sometimes politicians use them to endear themselves to voters while the electorates quite often use the same to deride and characterize them.

Keywords: *Connotation, nickname, onomastics, politics, semantics.*

BRIDGING THE DIGITAL DIVIDE IN PROVISION OF BASIC EDUCATION AMONG PASTORALIST: A STUDY OF WEST POKOT COUNTY, KENYA

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Abstract

The demand for education among children in the pastoral communities in Kenya has been on the rise due to government, religious groups, non - governmental organisations and community-based initiatives aimed at ensuring education for all have been attained. Whereas digital penetration in other parts of the country is high, the situation in pastoral areas in the country remains low. To bridge this gap, various initiatives have been introduced by the government. This paper explores the status of bridging of digital divide to support basic education in West Pokot County. The study sought to determine secondary school teachers' level of digital competencies, the status of digital infrastructure in public secondary schools, the methods used to bridge the digital divide in provision of secondary education in schools and the challenges influencing the provision of basic education in West Pokot County public secondary schools. The study was conducted in Central Pokot and North Pokot (Kacheliba) Sub Counties. A total of 88 schools were targeted. The study used mixed method research design. A sample size of 26 schools was selected from which 1 principal and 2 teachers from each school participated. Data was collected using questionnaire and interview schedule. Quantitative data was analysed using descriptive statistics with the help of SPSS. Qualitative data was analysed using thematic content analysis. Results showed that only 40.0% of teachers possess higher level digital skills in the schools that were sampled for the study. Only 35.0% of schools had found to have adequate digital infrastructure to support integration of technology in teaching and learning in schools. Thirdly, the study found out that radio lessons, computer lessons, audio and visual devices (projectors, CDs, memory sticks, DVDs), TV lessons (EduTV) and internet learning (google classrooms) were some of the initiatives that were undertaken to bridge digital divide in West Pokot Sub County. Some of the challenges found were; inadequate digital training of teachers, inadequate ICT resources, outdated ICT resources, poor internet connectivity, lack of electricity among others. There is need for the government to enhance digital training skills among teachers in secondary schools. Schools. There is also need for schools to seek partnership with non-state organisations to improve teachers' digital skills and achievement of infrastructure in their schools and government should also ensure that electricity and internet network is available in all public schools through fibre or satellite.

Keywords: *Digital, divide, pastoral, technology.*

INTEGRATION OF EDTECH AND DIGITAL LEARNING IN CURRICULUM IMPLEMENTATION IN PUBLIC LOW COST BOARDING PRIMARY SCHOOLS IN TURKANA COUNTY.

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Abstract

Education technology facilitates digital learning that makes learning more real, flexible and interesting. Digital integration in learning brings down the cost of education, improves efficiency and enhances the quality of teaching. It is more relevant to ASAL Counties that are remote and have acute shortage. The purpose of the study investigated the integration of EdTech and digital learning programmes in curriculum implementation. The study determined the influence of EdTech and digital learning on the development of instructional resources and the level of integration of EdTech and digital learning in learner assessment in public low-cost boarding primary schools in the County. The study was guided by Universal Design for Learning (UDL) theory. The descriptive study design was used. Target population comprised 480 teachers and 60 heads of institutions (HoI) from 60 public low-cost boarding primary schools as well as 22 CSOs in Turkana County. Random sampling was used to select 7 CSOs, 18 HoIs and 54 teachers from 18 public low-cost boarding primary schools. Information was gathered using an interview schedule, a closed-ended questionnaire with a Likert type scale of 1 to 5 as well as FDG with the CSOs. Data was analyzed using percentages, means, standard deviations and correlations and linear regressions. It was observed that teachers were not sufficiently equipped in EdTech and digital learning hence did not integrate EdTech in designing teaching and learning resources. The study concluded that the teachers in public low-cost boarding primary schools in Turkana County had not fully adopted EdTech and digital learning.

Keywords: *EdTech, digital learning, integration, curriculum implementation, public low-cost boarding primary schools, Turkana County.*

LEVERAGING ARTIFICIAL INTELLIGENCE APPLICATIONS AS CATALYSTS FOR MANAGEMENT OF TEACHER TRAINING PROGRAMMES IN PUBLIC UNIVERSITIES IN NAIROBI COUNTY, KENYA

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Abstract

Institutions of higher learning have embraced artificial intelligence applications as a strategy for improving management of teacher training programmes. However, in public universities in Nairobi County, management of teacher training programmes has had challenges with low enrolment of teacher-trainees, challenges with teaching practice, wastage of instructional time and ineffective communication. This study sought to examine necessity of leveraging artificial intelligence applications as catalysts for management of teacher training programmes in public universities in Nairobi County, Kenya. The study adopted mixed methodology and thus, applied concurrent triangulation research design. The target population was 4080 respondents which comprised 36 Deans of Schools of Education, 180 Heads of Departments, 407 lecturers and 3457 teacher-trainees from which a sample of 364 respondents was selected using Yamane's Formula. Qualitative data was analyzed thematically along the objectives and presented in narrative forms. Quantitative data was analyzed descriptively using frequencies and percentages and inferentially using Pearson's Product Moment Correlation analysis in Statistical Packages for Social Science (SPSS 26) and presented using tables. Results showed that management of teacher training programmes in public universities had multiple challenges with low enrolment of teacher-trainees, challenges with teaching practice, wastage of instructional time and ineffective communication leading to low completion rates. To mitigate these challenges, learning institutions need to embrace artificial intelligence applications to support planning of teacher training activities. Results showed not much has been achieved in improving management of teacher training programmes. There is need for public universities to invest in artificial intelligence tools that are geared towards improving planning and management of teacher preparation activities.

Keywords: *Artificial intelligence applications, catalysts, public universities.*

REDEFINING PARENTAL INVOLVEMENT IN COMPETENCY BASED CURRICULUM IMPLEMENTATION IN KENYA. A CRITICAL REVIEW

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Abstract

Kenya has made significant strides in the implementation of the Competency-Based Curriculum (CBC). However, its implementation has been faced with several challenges, which the Kenya's government has been trying to address. Parents have raised concerns about their involvement in their children's academic work and their increased role in the implementation of the new curriculum. The purpose of this study was to review literature and to determine parental involvement in the implementation of competency-based curriculum. The Structural Functionalism Theory by Emile Durkheim guided the study. Desktop critical review of various journal articles and other secondary sources was carried out. The study established that there has been a huge concern from parents that the new curriculum is quite expensive and demanding to them and a misconception on the way they are to be involved in the implementation of the new curriculum. Parental involvement does not only mean helping learners in doing assignments but in the whole process of learning. The new curriculum does not only focus on academic work but also nonacademic work and therefore, it is imperative for parents to assume their rightful role in the holistic development of their children. Since the focus of the new curriculum is on the competencies, the feedback from parents is very vital in complementing teachers' role especially in guiding their children chose the right pathway in senior school. The paper recommends that there is a need for constant communication between the teachers and the parents through all the available channels. The expanded role of the parents in the implementation of the new curriculum should be explained well so as to overcome the teething problems that are being associated with the Competency Based Curriculum.

Keywords: *Parental involvement, competency-based curriculum, nonacademic, pathway.*

ADAPTABILITY OF PROBLEM-BASED LEARNING (PBL) APPROACHES IN KENYAN UNIVERSITIES IN PREPARATION FOR COMPETENCY-BASED CURRICULUM (CBC) IN KENYA

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Abstract

Implementation of Competency-Based Curriculum (CBC) was unveiled in Kenya in 2017 replacing the 8-4-4 system and Higher education systems in Kenya are warming up to adopt the new system in 2029. CBC has changed the focus from mastery of content and examinations to focusing on learners' performance of skills and competencies. Introduction of Problem-Based Learning (PBL) in Kenyan Universities provides an easy way for institutions to implement CBC. This is because the similarities between the two approaches focus on the development of skills such as communication, critical thinking, teamwork, problem-solving, and utilization of digital skills among other soft skills. The transformation to PBL will shift educational success from teaching to learning and its success will depend on how well the Universities adapt to the changes. Notably, the earlier the Kenyan universities embrace PBL, the easier it will be to implement the CBC when the time comes. This study was conducted at Daystar University. Participants were lecturers and students selected from the seven schools of Daystar University as well as library staff in the University. Quantitative methods of data collection were utilized and descriptive data analysis applied in analysis of data.

Keywords: *Problem-based learning, competency-based learning; universities, higher education.*

EXPLORING ENDEARING METAPHORS AMONG SWAHILI YOUTHS IN MOMBASA COUNTY, KENYA: INSIGHTS FROM CONCEPTUAL MAPPINGS

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Abstract

Endearing metaphors are valuable for enriching communication and fostering closer and more meaningful relationships through expression of affection and intimacy. Interpreting endearing metaphors can however be difficult due to their cultural distinctions and context-dependent meanings. It is against this backdrop that this study employed the principle of conceptual mappings to analyze the endearing metaphors commonly used by the male Swahili youths in Mombasa County to woo their beloved. A descriptive research method was used. Primary data was collected from four purposively sampled Swahili male youths through an interview schedule. Data was then subjected to the Metaphor Identification Procedure *Vrije Universiteit* (MIPVU) in which four annotators were used to identify endearing metaphors. Seven endearing metaphors that are commonly used by the Male Swahili youths in Mombasa County were identified through MIPVU. The endearing metaphors were then subjected to the principle of conceptual mappings to reveal their meaning. Results showed that young Swahili men in Mombasa County use endearing metaphors to express affection, admiration, and romantic interest in their beloved persons. They also use these metaphors to inspire a sense of connection and emotional intimacy while aiming at building a relationship based on care and mutual affection. The study concludes that endearing metaphors are useful tools of communication, and should be interpreted within the Cognitive Linguistics framework.

Keywords: *Endearing metaphors, swahili, conceptual mappings, cognitive linguistics, MIPVU.*

INFLUENCE OF USABILITY SKILLS OF SMARTPHONES ON THE PSYCHOLOGICAL WELL-BEING OF UNIVERSITY STUDENTS AT RONGO UNIVERSITY, KENYA.

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Abstract

Over the years, the use of smartphones has been realized in people's lives to the extent that it has become part of them. Its profuse use has led to research by various scholars on the impacts that it has on the user positively and negatively. However, not so much has been done about its impact on the psychological well-being of university students. The purpose of the study was to examine the influence of usability skills of smartphones on the psychological well-being of University students at Rongo University, Kenya. Results are presented in the form of tables and figures for a clear and concise representation. There was a moderate positive influence ($r=.458$) of usability skills on the psychological well-being of university students which was statistically significant ($p=.000$) at .05 significant level. There is need for University student counselors' office to create awareness of the influence of smartphone usability on the psychological well-being of university students. The University should design a course for students to enhance their repertoire of skills that they can appropriately apply to tackle the day-to-day challenges involving smartphone use.

Keywords: *Influence, usability skills, smartphone, psychological well-being, university students, Rongo university, Kenya.*

ATHARI YA UBINAFSISHAJI WA MAMLAKA NA RASILMALI ZA UMMA KWA WATAWALIWA KATIKA RIWAYA YA MBIO ZA SAKAFUNI

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Ikisiri

Kiongozi yeyote awaye huwa na jukumu la kuhakikisha usawa katika ugavi wa pato la jamii anayoiongoza bila mapendeleo wala ubinafsi. Jambo hili huwezesha umoja na mshikamano wa jamii. Mara kwa mara viongozi hupuuza matarajio ya jamii zao katika kutekeleza wajibu wao. Hili hutokea pale ambapo wanazingatia tamaa yao na ubinafsi. Ni kutokana na haya ambapo makala yanayopendekezwa yananua namna ambavyo riwaya ya Kiswahili imesawiri hali ya viongozi kukiuka usawa na kuongozwa na ubinafsi katika utendakazi wao. Mbinu kusudio ilitumiwa katika kuteua riwaya ya *Mbio za Sakafuni* itakayotumiwa katika usomi huu. Riwaya hii ilituliwa kwa vile usomaji awali ulidhihirisha kuwa riwaya hii ina data ya kutosha kukidhi mahitaji ya utafiti unaokusudiwa. Utafiti huu utachukulia kuwa kiongozi anayezingatia ubinafsi na kupuuza haki na usawa ni kiongozi mbaya. Makala haya yanalenga kujibu maswali yafuatayo: Je, ni matendo gani ya viongozi katika riwaya teule ambayo yanadhihirisha ukiukaji wa haki na usawa? Je, ukiukaji huu una athari gani kwa jamii inayoongozwa na viongozi kama hawa? Utafiti huu unaongozwa na nadharia ya daindamano. Hii ni nadharia ya kimaadili ambayo imejengwa katika misingi kuwa kiongozi anatakiwa kutenda kitendo chochote ikiwa kitendo hicho kinanufaisha wanajamii walio wengi, vinginevyo uongozi wake utakuwa mbaya. Matokeo ya utafiti huu yatatumiwa kupendekeza misingi inayopaswa kutumiwa na viongozi kupimia matendo mema ya kufanya na matendo mabaya ya kuepuka. Huu ni utafiti wa kimaktabani. Data itakayokusanywa itakuwa ya kimaielezo na hivyo itachanganuliwa na kuwasilishwa kwa njia ya kimaielezo.

Keywords: *Athari ya ubinafsishaji, mamlaka na rasilimali, umma kwa watawaliwa katika riwaya ya mbio za sakafuni.*

FASIHI YA KISWAHILI KAMA KICHOCHEO CHA UHAMASISHAJI WA GEN Z KUHUSU MAPINDUZI NCHINI KENYA

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Ikisiri

Makala inayokusudiwa itatafiti nafasi ya Fasihi ya Kiswahili katika kuhamasisha jamii kuhusu mapinduzi kwa lengo la kuboresha uongozi. Makala itajikita katika kutafiti mchango wa fasihi kwa shule za upili nchini Kenya katika kuwazindua vijana ili kutetea haki na usawa katika jamii. Utafiti utahakiki riwaya tatu ambazo zimetahiniwa katika shule za upili nchini Kenya katika kipindi ambacho kundi la wanajamii wanaotambulika kama Gen Z walikuwa wanasoma. Kwa hivyo, riwaya hizi zitateuliwa kwa kutumia mbinu kusudio kwa vile ndizo riwaya zilizosomwa katika kipindi ambacho vijana whawa walikuwa wanasoma katika shule za upili. Riwaya hizi ni *Utengano*, *Kidagaa Kimemwozea* na *Chози la Heri*. Makala itachunguza ikiwa riwaya hizi zilipalilia mawazo ya mapinduzi ambayo yalidhihirika bayana nchini Kenya mwaka wa 2024. Kauli na matendo ya vijana hawa yalioneshwa mwamko mpya na msukumo wa kipekee ambao haujaoeleka nchini. Je, riwaya teule zinapiga mwangwi wa vijana kilugha na kimatendo kwa namna gani wakati wa maandamano nchini Kenya mwaka wa 2024? Utafiti huu utaongozwa na Nadharia ya Marx. Mawazo muhimu ya nadharia hii ni kuwa, kila wachache walio uongozini wanaponyanyasa wananchi walio wengi, wananchi hao wanapaswa kuungana na kutumia nguvu katika kuwang'oa wanyanyasaji hao mamlakani. Matokeo ya utafiti huu yatatumiwa kusisitiza nafasi ya fasihi katika jamii. Kwamba fasihi ikifunzwa vyema inaweza kutatua matatizo mengi katika jamii ya sasa. Utafiti huu utakuwa wa kithamano. Utafanywa maktabnai na kwenye mitandao. Kwa hivyo data itakayokusanywa itachanganuliwa na kuwasilishwa kithamano vilevile.

Keywords: *Fasihi ya kiswahili, kichocheo cha uhamasishaji, Gen Z, mapinduzi, nchini Kenya.*

AN INVESTIGATION INTO THE CHALLENGES FACED BY STUDENTS WITH DISABILITIES IN ACCESSING LECTURES AT UNIVERSITIES IN KENYA: IMPLICATIONS FOR INCLUSIVE EDUCATION

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Abstract

Access to quality education is a fundamental right for all students, including those with disabilities. However, students with disabilities at Kirinyaga University face multiple challenges accessing lectures, impacting their academic experience and performance. This study aimed to investigate these barriers and provide recommendations for improving accessibility. The objectives were to identify physical and infrastructural barriers to lecture hall access, evaluate availability and effectiveness of assistive technologies, assess the level of training among faculty and staff in inclusive teaching methods, and understand the psychological impact of accessibility barriers on students with disabilities. A mixed-methods approach was employed, incorporating surveys and interviews with students, faculty, and administrative staff. Physical accessibility of lecture halls, the availability of assistive technologies, teaching methods, and the level of awareness regarding the needs of students with disabilities was assessed. Results revealed that Kirinyaga University has made significant progress in enhancing accessibility. Evidence indicates that post-2018 buildings are equipped with lifts and ramps, improving physical access for students with mobility challenges. There is need to enhance physical infrastructure, adopt assistive technologies, and increase awareness and sensitivity training for faculty and students to foster a more inclusive academic environment for all students, regardless of their disabilities.

Keywords: *Disabilities, accessibility, inclusive teaching, assistive technology, physical infrastructure, staff training, academic participation.*

PROSPECTIVE TEACHER EDUCATOR PROFESSIONAL DEVELOPMENT THROUGH CREATION OF MULTIMEDIA CASE STUDIES

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Abstract

Despite the importance of teacher educators in influencing the quality of teacher education and by extension, the teacher quality, teacher educator preparation and professional development (PD) receives little attention from researchers and its pedagogical knowledge domain is often generalized from that of teachers. Teacher educators however, constitute a specific category of professionals, needing specific expertise for the specific goals and responsibilities of preparing teachers. They are thus in need of opportunities to acquire and develop that specific expertise. This study explored the knowledge development of prospective teacher educators (PTE) through creating multimedia case studies (MMCS) of practice. The study was based on analysis of data collected through a teacher development experiment with eighteen PTEs during a two-semester course for doctoral students in teacher education programs. Results showed that through creation of MMCSs, PTEs developed greater appreciation of the complexity of teaching and learning, appreciated the importance of reflection as teaching and learning task, got opportunities to think in new ways about their own learning and developed better understanding of linking theory and practice. These findings generally indicated that PTEs need PD opportunities that would enable them to confront and break their previously held conceptions about teaching and learning while embracing modern research-based developments such as approaches to teaching large classes, enhancing child-centered learning, and issues of disability, social justice or unforeseen circumstances like a pandemic. This would enable them provide an inclusive and equitable education that enhances lifelong learning and skill development. The MMCSs created would enhance EdTech and Digital Learning for example by use with PTEs to strengthen teacher capacity.

Keywords: *Prospective teacher educator, professional development, creation, multimedia case studies*

SUBTHEME: PHYSICAL AND NATURAL SCIENCES**INTERGRATING SCIENCE AND TECHNOLOGY FOR
SUSTAINABILITY: MODELLING HEAVY METAL BEHAVIOUR
IN RIVER ECOSYSTEMS**

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The most important resource of life in this planet is water. With the rapid economic growth, heavy metal pollution has become a key issue in rivers which are a source of drinking water in the world. Heavy metals contamination in river waters pose significant risks to both ecosystems and human health. Accurate prediction of heavy metals concentration is essential for effective water quality management and environmental protection. The objective of this study was to develop and solve a numerical model to predict the spatial and temporal distribution of heavy metal concentration in river water under varying flow conditions. The model incorporates the advection -dispersion equation. The advection diffusion equation was solved numerically to predict the spatial and temporal distribution of heavy metal concentration in a rivers system under varying environmental conditions. The equation was discretized using finite difference method (central differences). The numerical solution was obtained using python programming language and validated analytically. The model gave results that were similar to the exact solutions. Sensitivity analysis was done on the model to assess how it was influenced by factors such as velocity, dispersion, sources and sinks. The model was applied to predict the spatial and temporal variations of heavy metals in Rupingazi river, Embu County. The model provides variable insights for managing pollution and can inform regulatory decisions on water quality control particularly in areas with industrial and agricultural runoff.

Keywords: *Heavy metal, spatial, temporal, discretization, validation.*

HUMAN INDUCED CLIMATE CHANGE: CAPTURING IT RIGHT USING AI

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Abstract

Economic growth is globally desirable. More so if it is green and sustainable. In the last decade environmental inclined economists have developed substantial knowledge-based relationship between economic growth and negative external factors. Industrial economists think otherwise. The critical differences being that knowledge reasoning is not real time and both economic growth and its external factors are either under or overestimated. Time congruency is also doubted. We used growth theory to examine the value of AI to generate paced, patterned and real time data to support the two arguments. A country based case study approach supported with literature was adopted. The article uses the cases of countries both developed and high paced developing countries to emphasize corrective analyses between human induced growth and negative external factors. Country data examination of economic growth and net climate change suggest that AI employment could accurately provide reliable correlation between human induced economic growth and net climate change.

Keywords: *Human induced climate change, economic growth, net climate change, AI, externalities.*

PHENOLIC ECOTOXINS IN RIVER WATER: SURVEY ON KNOWLEDGE AND PRACTICES OF ROAD-SIDE FOOD VENDORS OPERATING ALONG RIVER CHANIA BANK FRINGES IN THIKA SUB-COUNTY, KENYA

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Abstract

Phenolic ecotoxins consumed in raw surface water from river sources has been implicated in causing diseases like cancers, in Kenya. This study was conducted in Thika Sub County, and data collected from roadside food vendors and food hawkers who operate small scale street food businesses along the fringes and banks of River Chania. The study objective was to establish the knowledge on Phenolic ecotoxins present in river water and practices of the study respondents. A cross-sectional descriptive study design was used, in which combined interviews and questionnaire enquiries were conducted on, $n=341$, small-scale road side food vendors and hawkers and data analyzed. None of the respondents had knowledge of Phenolic ecotoxin contaminants and additionally a strongly associated correlation ($P<0.001$, $\chi^2_{22.6}$ and $df 1$), further augments the disclosure that, poor knowledge of raw river water safety and hygiene does result to body harm and ill health. There is increased need to scale up sensitization and awareness of human exposure to harmful ecotoxin contaminants results from use of raw river water. Water decontamination mobile units should be considered and introduced especially in urban areas of high population density, transversed by rivers.

Keywords: *Knowledge, practices, phenolic ecotoxins, river chania, roadside food vendors/hawkers.*

EFFECTS OF *Withania somnifera* ROOT EXTRACTS ON SEROTONIN SECRETION IN SWISS ALBINO MICE

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Abstract

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

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

EXPERIMENTAL EVALUATION OF BIOGAS YIELD FROM WATER HYACINTH AND FISH OFFAL CO-DIGESTION

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Abstract

Water hyacinth, an invasive aquatic weed, poses significant socio-economic and environmental challenges in Lake Victoria and other freshwater bodies. Its high biomass potential makes it a viable substrate for biogas production. However, its lignocellulosic composition limits biodegradability, affecting biogas yield. Co-digestion with nutrient-rich fish offal may enhance biodegradation and improve biogas output. This study investigates the synergy of co-digesting water hyacinth from Lake Victoria (Kisumu County) with fish waste from Rio Fish (Migori County). The objectives of the study are to characterize the chemical composition of both substrates and evaluate the influence of process parameters—pH, temperature, retention time, and substrate mix ratios—on biogas production. Proximate analysis, crude fiber determination, elemental composition, and biochemical assessments were conducted. Results indicate that water hyacinth has high cellulose, hemicellulose, and carbohydrate content with low lignin, making it suitable for biogas production. Fish offal, while rich in proteins and lipids, contains inhibitory compounds that can affect anaerobic digestion when used alone. Co-digestion improved substrate balance, enhancing methane yield and overall biogas production. Optimal conditions were achieved at a specific substrate ratio, temperature, and pH range. It is concluded that co-digestion of water hyacinth with fish waste is a viable strategy for improving biogas yield while mitigating environmental issues associated with aquatic weed invasion and fish processing waste disposal. Further research is recommended to optimize large-scale applications.

Keywords: *Biomass, biogas, co-digestion, co-substrate.*

DESIGN OF LOW-COST EYE PHANTOMS AND ITS CHARACTERISATION USING ADAPTIVE OPTICS

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Abstract

The human eye is subject to optical imperfections such as ocular wavefront aberrations, which vary among individuals and affect both vision and ability to observe fine ocular structures. Uncorrected refractive errors and cataracts are leading causes of global visual impairment. This study presents advancements in the fabrication and characterization of low-cost eye phantoms, emphasizing integration of adaptive optics (AO) for ophthalmic imaging. Eye phantoms, which simulate the optical properties of the human eye, are essential tools for calibrating imaging systems and ensuring clinical accuracy. Traditional fabrication methods, however, were costly and labor-intensive, limiting accessibility in resource-constrained settings. To overcome this, recent research has focused on developing more affordable techniques without compromising the optical fidelity of these models. AO technology, initially developed for astronomy, is leveraged to assess and correct optical aberrations in real-time, offering high-resolution imaging of the phantoms. This approach ensures that the phantoms closely mimic the optical characteristics of human ocular tissues, enhancing the evaluation of imaging systems under realistic conditions. Furthermore, this study incorporates the design of phantoms replicating the crystalline lens, crucial for simulating normal vision and refractive errors like myopia and hyperopia. Using Zemax Optic Studio, the optical properties of the lens are modeled to investigate how these errors affect the eye's focusing power. The combination of low-cost fabrication and AO-enabled characterization holds significant potential for improving ophthalmic imaging technology, particularly in underserved areas.

Keywords: *Fabrication, eye phantoms, optical aberrations, refractive errors, adaptive optics, ophthalmic imaging, crystalline lens simulation, zemax optic studio, characterization.*

LINEAMENT EXTRACTION USING GRAVITY DATA IN OLKARIA GEOTHERMAL FIELD, KENYA

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Abstract

Geological faults are essential requirements in geothermal systems. Lineament is an important feature in showing subsurface structures as faults. In recent years' automatic lineament extraction has gained huge popularity as it circumvents issues such as errors and time constraints that are associated with manual extraction procedure. This study aims to identify subsurface lineaments automatically from gravity data. Gravity data from Olkaria geothermal field was measured, corrected and a Bouguer anomaly obtained. Polynomial regression and Quadratic Square trend surface analysis techniques were used to filter the data into regional and residual anomalies. Subsurface lineaments were generated from the residual contour map using Gaussian filter edge detection and curve extraction parameters of the line module of the PCI Geomatica. Density lineaments map was extracted which displayed faulting of the area. Orientation of lineaments was presented using rose diagrams where the main trend of the subsurface fault structures was observed to be dominantly in NW-SE and the predominantly in N-S. Areas with high density lineaments were located around the center of the field, while the west area of the field had less fracturing.

Keywords: *Lineament extraction, gravity data, Olkaria geothermal field, Kenya.*

BACTERIAL CELLULOSE COMPOSITES AS POTENTIAL WOUND DRESSING ALTERNATIVE

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Abstract

Wound dressings are normally used to cover the wound and heal it in the shortest time possible and hasten skin regeneration, however this is not the case with current commercial dressing. Bacterial cellulose is a natural polymer produced by microorganism such as Bacteria and has emerged as a promising material for wound healing due to its unique properties such as Biocompatibility, moldability, water retention, biodegradability, high purity, mechanical strength and ease of fabrication. However, it lacks antimicrobial properties hence this restricts its applicability as a wound dressing material. The objective was to fabricate bacterial cellulose based composites and testing them as wound dressing materials to check the effectiveness on Swiss mice models. SEM, FTIR, and XRD tests showed the extracts were successfully impregnated except BC/Bacitracin. BC/Turmeric/Aloe, BC/Turmeric, BC/Aloe demonstrated faster skin regeneration capacities and hence faster healing of the acute incised wounds on Swiss mice model. The composites promoted wound healing in record four days, 90% complete wound closure by day six by three composites. Untreated acute wound, Native BC, Bc/Bactricin composite demonstrated approximately 40% healing. BC/Turmeric/Aloe composite exhibited faster wound healing than commercially dressing omaeraplast and the control group, therefore recommended as a potential wound dressing for wounds. Hence this study concludes that fabricated BC based composites particularly when combined with plant extracts hasten wound healing process and therefore could act as petroleum-based alternative.

Keywords: *Wound dressing, bacterial cellulose, composites, wound healing.*

COMPARATIVE PERFORMANCE AND STATISTICAL VALIDATION OF MOBILENETV2 AND SHUFFLENET FOR MULTI-CLASS CROP DISEASE CLASSIFICATION

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Abstract

Crop disease classification is crucial for global food security, as early detection and accurate identification help mitigate crop losses. However, manual disease identification remains inefficient and prone to human error, especially in large-scale farming. Deep learning (DL), particularly convolutional neural networks (CNNs), has significantly improved classification accuracy, enabling automated and scalable disease detection. Nonetheless, selecting models that balance accuracy, computational efficiency, and deployability in resource-limited settings remains a challenge. This study conducts a comparative analysis of two lightweight CNNs—MobileNetV2 and ShuffleNet—for multi-class crop disease classification. Both models were trained and tested using the Plant Village dataset and a locally collected dataset to ensure real-world applicability. MobileNetV2 achieved higher validation accuracy (98.21% vs. 97.45%) and test accuracy (99.0% vs. 96.8%) compared to ShuffleNet. Additionally, MobileNetV2 demonstrated superior performance in key reliability metrics, including F1-score, Cohen’s Kappa, and Matthews Correlation Coefficient. In terms of computational efficiency, MobileNetV2 exhibited faster inference time (0.0938s vs. 0.1012s per image), making it more suitable for real-time applications. However, Shuffle Net had a smaller model size (26.85MB vs. 30.38MB) and fewer parameters (2.30M vs. 2.61M), which can be advantageous for ultra-lightweight deployments. Despite its efficiency, Shuffle Net’s slightly lower classification performance may impact precision in real-time agricultural applications. Statistical analysis confirmed significant differences in model performance ($p < 0.05$). These findings underscore the trade-offs between accuracy and computational efficiency. MobileNetV2 is ideal for high-accuracy, real-time disease classification, while Shuffle Net offers a lightweight alternative with marginally lower accuracy but reduced model complexity. This study contributes to advancement of AI-driven precision agriculture by guiding model selection based on operational constraints and deployment needs in resource-constrained environments.

Keywords: *Comparative performance, statistical validation, mobilenetV2, shuffle net, multi-class crop disease classification.*

GENERATION OF POLARIZED DIGITAL HOLOGRAMS BY VARYING THE POLARIZATION ANGLE OF OBJECTIVE BEAM AND REFERENCE BEAM

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Abstract

Holography is an imaging technique that has attracted much attention since its inception due to its potential of recording three-dimensional images. As a result, the technique has been applied in interferometry, microscopy, and many more. However, its recording has relied on the use of non-polarized sensitive materials. As such, its application has been limited to isotropic materials. In this study we report the recording and reconstruction of polarized digital holograms. The Mach-Zehnder interferometer holographic experimental setup was used, and the holograms were captured using a charged-coupled device (CCD) camera with numerical reconstruction and propagation performed using MATLAB R2018a software. During the recording, some conditions were optimized to realize their effect on holograms. Camera position from the object was varied while varying the polarization angle of the main and object beam by the help of optical components. By varying the polarization angle of both the objective and reference beams we have managed to capture a more comprehensive set of light wave characteristics, including; intensity, phase, and polarization state. We have managed to record and reconstruct holograms at polarization angles of 15° , 30° and 45° whose amplitude and phase information was extracted at an optimum distance of 15cm. Experimentally, we have obtained linearly polarized phase holograms and optimized conditions to realize the effect they have on holograms. We can conclude that, holograms should be recorded at an optimum distance of 15cm since results obtained exhibit the light wave characteristics. This advancement not only enhances the visibility of objects that are otherwise obscured or low contrast but also broadens the application of holography beyond isotropic materials. Therefore, we recommend this approach since it could open new avenues in fields, providing deeper insights and more detailed imaging capabilities. It is exciting to see how this technique can fulfill the ultimate goal of holography by registering all the characteristics of the light wave.

Keywords: *Amplitude, hologram, interferometry, isotropic, polarization and three-dimensions.*

CONTRIBUTION OF INDIGENOUS AGRICULTURAL PRACTICES TO CLIMATE CHANGE RESILIENCE IN MOGOTIO SUB-COUNTY, BARINGO, KENYA

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Abstract

Indigenous agricultural practices, refined over generations, present viable solutions to strengthening climate change resilience. However, limited research exists on their effectiveness in mitigating climate impacts in Mogotio Sub-County. This study aimed to assess the role of indigenous agricultural methods in enhancing climate resilience in Mogotio Sub-County, Baringo, Kenya. A descriptive survey research design was employed, targeting a sample of 384 households. Data collection relied primarily on household questionnaires. Qualitative data was analyzed using descriptive statistics, while logit regression analysis identified key contributions of indigenous farming practices to climate resilience. Results indicated that community perceptions and local knowledge systems played a crucial role in resilience-building. Key determinants included positive climate change perceptions (odds ratio: 2.31), traditional weather prediction techniques (odds ratio: 2.46), and adaptive strategies such as irrigation and crop rotation (odds ratio: 2.22). Furthermore, community knowledge sharing (odds ratio: 2.59) was a significant factor in strengthening climate resilience. This study underscores the importance of indigenous solutions in addressing climate challenges and fostering community-driven resilience strategies. It recommends awareness programs to educate residents on the benefits of indigenous crops and urges national and county governments to allocate funds for subsidized inputs, including indigenous seeds and tools suited for traditional farming methods.

Keywords: *Indigenous agricultural practices, indigenous knowledge, climate change, resilience, Mogotio Sub County.*

HIGH-ORDER HARMONIC GENERATION IN A TWO-COLOR LASER FIELD: A COMPUTATIONAL STUDY.

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Abstract

High-order harmonic generation (HHG) in a two-color laser field has emerged as a powerful technique for enhancing harmonic yield, extending the cutoff energy, and controlling the spectral and temporal properties of the generated harmonics. In this study, we investigate HHG in a two-color field consisting of a fundamental laser pulse and its second harmonic using computational modeling. We explore the effects of relative phase, intensity ratio, and wavelength on the harmonic spectrum and cutoff energy. Our results demonstrate that the two-color field significantly enhances harmonic efficiency and enables generation of isolated attosecond pulses. This work provides insights into optimizing HHG for applications in attosecond science and coherent XUV generation.

Keywords: *Inhomogeneity parameter, two-color field, high-order harmonic, polarization angle, harmonic orders.*

SUBTHEME: BUSINESS AND ECONOMIC TRANSFORMATION**INFLUENCE OF KNOWLEDGE ACQUISITION ON HUMAN RESOURCE PLANNING IN THE PUBLIC SERVICE COMMISSION OF KENYA**

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Abstract

Human resource planning is a critical aspect of organizational success. However, many organizations struggle with effective workforce planning, leading to issues such as skills gaps, high turnover, and difficulty in meeting business objectives. Knowledge acquisition plays a pivotal role in organizational growth and development. It encompasses three key indicators: training attendance, external resource utilization, and informal knowledge transfer. This study anchored on knowledge acquisition on human resource planning. The research, anchored on knowledge-based view theory, employed a positivist philosophy and mixed research design combining quantitative and qualitative approaches. The target population consisted of 209 employees from various hierarchical levels within the Public Service Commission of Kenya. Census sampling was employed. The study utilized both descriptive and inferential statistics for data analysis. Correlation analysis results showed that knowledge acquisition was positively and significantly associated with human resource planning ($r = 0.695$, $p=0.000$). Regression results showed that knowledge acquisition significantly influenced human resource planning in the Public Service Commission of Kenya, with the model explaining 48.3% of the variation in human resource planning ($R^2 = 0.483$). ANOVA results confirmed the statistical significance of this relationship with an F-statistic of 173.178 ($p=0.000$). There is need for Public Service Commission of Kenya to prioritize and enhance its knowledge acquisition practices through implementation of structured programs for continuous learning and development, including regular training sessions, workshops, and seminars focused on emerging trends in human resource management and public administration. By demonstrating a positive relationship between knowledge acquisition and human resource planning, the study provides empirical support for the knowledge-based view theory assertion that knowledge is a critical resource for organizational success.

Keywords: *Human resource planning, knowledge acquisition.*

INFLUENCE OF STRATEGIC HUMAN CAPITAL PRACTICES ON EXTERNAL LABOUR MOBILITY IN PUBLIC LEVEL FIVE HOSPITALS IN KENYA

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Abstract

The objective of this study was to investigate the influence of strategic human capital practices on external labour mobility in public level five hospitals in Kenya. The study adopted the mixed research design method involving a variety of analytical methods. The Human Capital Theory was used to explain the relationship between the variables in the study. The study targeted a population of 4,388 medical officers and nurses in the fourteen public level five hospitals in Kenya, from which a sample of 353 respondents was selected using stratified random sampling methods while purposive sampling technique was used to select the eight (8) public level five hospitals representing the former provinces in Kenya. Quantitative data was analyzed using both descriptive and inferential methods. The descriptive statistical tools included frequencies, percentages, means and standard deviation. Inferential statistical models included correlation coefficients and regression analysis to determine the relationship between the variables through SPSS version 22-computer program. Results indicated that strategic human capital practice was a significant predictor of external labour mobility. Strategic health and safety was not a significant predictor of external labour mobility. The study recommended development of a training need assessment/analysis in the health facilities. Future research should focus on other strategic human resource management practices influencing external labour mobility especially on generational groups.

Keywords: *Training technique, training needs analysis, cost of training, content of training.*

INTEGRATING LOCAL PERSPECTIVES AND TECHNOLOGICAL INNOVATIONS FOR SUSTAINABLE DEVELOPMENT IN MARGINALIZED PASTORALIST COMMUNITIES; LESSONS FROM EAST POKOT

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Abstract

Marginalized pastoralist communities, such as those in East Pokot, Kenya, experience systemic exclusion from education, healthcare, and economic opportunities, further exacerbated by resource scarcity and insecurity. Based on findings from research conducted in East Pokot, this study proposes integrating local perspectives with innovative, context-sensitive technologies to foster sustainable development and reduce systemic inequities. Using an exploratory qualitative research design, data was gathered through focus group discussions and key informant interviews with community members, local leaders, and stakeholders. Results showed that marginalization manifests in limited access to education, inadequate infrastructure, and political underrepresentation, all of which intensify resource-based conflicts. To address these challenges, this study explores the potential of educational technologies (EdTech) to bridge learning gaps, Internet of Things (IoT) applications for monitoring and optimizing scarce resources, and blockchain technology to enhance transparency in land rights and livestock markets. The study also identified significant barriers, including insufficient infrastructure and low digital literacy, necessitating phased, community-driven implementation strategies. By leveraging local knowledge and inclusive policy frameworks, these technologies can address socio-economic inequities, mitigate conflict, and promote sustainable development. This paper highlights the scalability of these solutions, drawing insights from complementary models like the One Acre Rule, and demonstrates their transformative potential for building resilience and equitable growth in marginalized pastoralist regions.

Keywords: *Local perspectives, technological innovations, sustainable development, Edtech technology, Internet of Things, block chain, marginalized pastoralist communities.*

ROLE OF CULTURAL EXPRESSION, COLLABORATIVE INNOVATION, AND TECHNOLOGICAL INTEGRATION IN ACHIEVING SUSTAINABLE DESIGN FOR AFFORDABLE HOUSING IN NAIROBI COUNTY, KENYA

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Abstract

Affordable housing is a critical challenge in rapidly urbanizing regions, particularly in Nairobi County, Kenya, where a staggering housing deficit of more than 250,000 units annually persists despite government initiatives like the Big Four Agenda. Shockingly, more than 60% of the urban population continues to live in substandard housing, mainly due to failure to integrate cultural expression, collaborative innovation, and technological advancements into housing projects. This grim reality underscores the urgent need for sustainable solutions. To address this challenge, this study focused on the role of cultural expression, collaborative innovation, and technological integration in achieving sustainable design for affordable housing in Nairobi County, Kenya. Rooted in Systems Theory, the study adopted a descriptive research design targeting 3050 stakeholders in housing projects, with respondents selected through stratified random sampling. Structured questionnaires were used to collect data, and descriptive and inferential statistics were used for analysis. A simple linear regression model was adopted to examine the relationships. Results showed cultural expression, collaborative innovation, and technological integration had a significant positive role ($\beta = 0.376$, $p < 0.05$) in promoting sustainable housing design. Specifically, these factors accounted for 75.3% of the variance ($R^2 = 0.753$) in achieving sustainable housing outcomes. These results highlight the critical importance of integrating cultural identity, fostering multi-stakeholder collaboration, and adopting advanced technologies to address the housing crisis in Nairobi County. There is need for policymakers, housing developers, and stakeholders to implement culturally relevant designs, promote inclusive collaboration, and incentivize the adoption of advanced technologies in housing projects. These measures are essential to bridging the housing gap, enhancing sustainability, and improving urban living standards in Kenya.

Keywords: *Integration, sustainability, interdisciplinary, cultural expression.*

STRATEGIC WORK-LIFE BALANCE AND EXTERNAL LABOR MOBILITY IN PUBLIC LEVEL FIVE HOSPITALS IN KENYA

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Abstract

The objective of this study was to investigate the influence of strategic work-life balance practice on external labour mobility in public level five hospitals in Kenya. The study adopted the mixed research design method involving a variety of analytical methods. The spill over Theory of work-life balance was used to explain the relationship between the variables in the study. The study targeted a population of 4,388 medical officers and nurses in the fourteen public level five hospitals in Kenya, from which a sample of 353 respondents was selected using stratified random sampling methods while purposive sampling technique was used to select the eight (8) public level five hospitals representing the former provinces in Kenya. Quantitative data was analyzed using both descriptive and inferential methods. The descriptive statistical tools included the frequencies, percentages, mean and standard deviation. Results showed that strategic work-life balance practice was a significant predictor of external labour mobility. There is need for County Executive Committee Members in the department of health to develop a policy framework to ensure flexi-work programs, childcare policies/facilities and holding rooms (nap pods) in the health care facilities. Future research should focus on other strategic human resource management practices influencing external labour mobility especially on generational groups such as strategic recruitment and selection, orientation/induction programs, voice involvement and participation, employee relations, human resource planning and reward management practices.

KeyWords: *Employee assistance programs, leave programs, child-care policies/facilities, flexi-work programs.*

POST COVID-19 HUMAN RESOURCE MANAGERS IN ORGANIZATIONS: A CRITICAL REVIEW OF LITERATURE

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Abstract

The world is increasingly becoming borderless with organizations moving from brick and mortar in an attempt to bridge the gap in performance. The emergence of COVID-19 as a disruptor in the workplace has forced many organizations to come up with strategies to assist them in performance. Despite the pandemic and associated crisis, HR Professionals are evolving their organizations towards a new era of employee-centric work culture. HR Professionals are playing a critical role in improving working lives, and not going back into traditional ways of thinking and functioning. Today, work can be easily performed across various cultures, geographies and time zones. The revolution is here and you cannot afford to be left behind. The most common strategy that most organizations have adopted to have an inclusive performance by all employees is by having internet and interconnecting the employees so that they can work actively in the office and remotely. Instrumented, interconnected, intelligent systems seamlessly link organizations from every part of the world. The broad penetration of high-speed Internet has peeled away the barriers of time, distance and even language to create a global forum for the exchange of ideas and information. Technology has increased interaction and performance in organizations promoting a cohesive workforce that meets its targets and goals hence changing the traditional roles of Human Resource Managers.

Key words: *Trans-border, peace, seamless, interconnected.*

MODERATING EFFECT OF PERCEIVED ORGANIZATIONAL SUPPORT ON THE INFLUENCE OF STRATEGIC HEALTH AND SAFETY PRACTICES ON EXTERNAL LABOUR MOBILITY IN PUBLIC LEVEL FIVE HOSPITALS IN KENYA

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Abstract

Human resources for Health are a strategic asset in the implementation of the universal health care coverage and their motivation, attraction and retention is instrumental in attaining the set goals and objectives. The objective of this study was to investigate the influence of strategic health and safety practices on external labour mobility in public level five hospitals in Kenya. The study adopted the mixed research design method involving a variety of analytical methods. Heinrich's Domino theory was used to explain the relationship between the variables in the study. The study targeted a population of 4,388 medical officers and nurses in the fourteen public level five hospitals in Kenya, from which a sample of 353 respondents was selected using stratified random sampling methods while purposive sampling technique was used to select the eight (8) public level five hospitals representing the former provinces in Kenya. Quantitative data was analyzed using both descriptive and inferential methods. Results showed that strategic health and safety was not a significant predictor of external labour mobility. There is need for the Government of Kenya (GoK) and the County Governments to offer sponsorship programs to the human resources for health; provision of personal protective equipment/gear and adequate working conditions to protect from occupational diseases and loss of life. Future research should focus on other strategic human resource management practices influencing external labour mobility especially on generational groups.

Keywords: *Health and safety committees, health and safety inspection, provision of equipment and lighting, leadership in health and safety.*

MODERATING ROLE OF ENTREPRENEURIAL PASSION IN THE RELATIONSHIP BETWEEN RESOURCE INNOVATION AND PERFORMANCE OF PHARMACEUTICAL MANUFACTURING FIRMS IN KENYA

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Abstract

For manufacturing firms to succeed in Africa, resources and passion is important for sustainability and growth. Research on resource innovation is in its infancy, and lacks consistency and theoretical connections to the theme of “entrepreneurial passion” and “performance”. This study aims to bridge this gap by exploring the effect and mechanism of entrepreneurial passion on the resource innovation and performance of manufacturing pharmaceutical firms in Kenya context. Using a survey method, primary data was collected from 113 firm owners/managers of manufacturing pharmaceutical firms of Kenya using a semi-structured questionnaire. Data was analyzed using partial least squares structural equation modelling (PLS- SEM) technique. There was a significant positive effect of resource innovation on performance. Results of the moderation analysis revealed that entrepreneurial passion significantly moderates (R^2 change of 0.026) the relationship between resource innovation and performance of manufacturing pharmaceutical firms in Kenya. This means that entrepreneurial passion gained 2.6% variance in performance above and beyond the variance explained by resource innovation alone. The study relied on a cross-sectional survey data. However, the factor, Entrepreneurial passion is generally dynamic in nature. This study provides valuable insights into the importance of entrepreneurial passion in the manufacturing sector and highlights the need for pharmaceutical companies to prioritize resource innovation and improve their overall performance and competitiveness. This study could also lead to effective resource management by informing entrepreneurs on how best to balance resources and business passion. The study used the resource-based view (RBV) by showing how these elements are important resources to enhance pharmaceutical firm performance which increases the scope of resource-based view and new areas for future studies in Kenya.

Keywords: *Entrepreneurial passion, resource innovation, performance.*

EFFECT OF BUDGETARY CONTROL SYSTEMS ON FINANCIAL PERFORMANCE OF PUBLIC UNIVERSITIES IN KENYA

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Abstract

Ideal financial management approaches require organizations to have a strong and robust internal control systems. This research investigated the impact of budgetary control mechanisms on the financial performance of public universities in Kenya. Using a mixed-methods approach, the study aimed to determine the extent of budgetary control implementation, analyse the relationship between budgetary control practices and key financial performance indicators, and identify the challenges faced in implementing effective budgetary controls on financial performance of public universities in Kenya. The study further examined the moderating effect of regulations and policies on the relationship between budgetary control systems and financial performance of public universities in Kenya. The research was anchored on agency theory and adopted a causal research design, targeting 160 respondents from 32 public universities. Census sampling technique was applied. Data was collected through surveys, interviews, and document analysis. Semi-structured questionnaires and secondary sources were used to collect primary and secondary data respectively. A total of 142 (88.75%) questionnaires were returned duly filled. Descriptive and inferential analysis was applied on the data. Reliability and validity of the research instruments was tested and the instrument adjusted accordingly. Normality of data was tested and the data did not suffer from multicollinearity or heteroscedasticity. Regression analysis was done to determine the effect of the independent variables on the dependent variable. Results showed that budgetary controls when regressed against the dependent variable were statistically significant. Regulations and policies did not have moderating effect on the relationship between budgetary controls and financial performance in public universities in Kenya. Budgetary control mechanisms had an effect on financial performance of public higher learning institutions. Budgetary controls can be seen as a mechanism to align the interests of university administrators with the government's objectives for efficient and effective resource utilization. Budgetary control systems can also be designed to provide incentives for efficient resource allocation and improved financial performance, thereby mitigating potential agency problems. There is need for University management in public universities to strengthen their budgetary control systems and that policy makers, regulatory authorities, the ministry concerned should formulate sound policies that strengthen budgetary controls of state corporations.

Keywords; *Budgetary control mechanisms, financial performance. public universities.*

FINANCIAL INCLUSION AND STOCK MARKET DEVELOPMENT IN KENYA

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Abstract

The Group of Twenty (G20) recognizes that financial inclusion is a key enabler in the fight against poverty. In effort to alleviating poverty in Kenya, the government identified the stock market as a key avenue in mobilizing resources. The Development of the stock market is thus a vital avenue that could be used to mobilize investment funds required for implementation of vision 2030 projects. However, the stock market is contributing less than one percent of growth financing against the government expectation of ten percent. This study sought to investigate the effect of financial inclusion on stock market development in Kenya. The specific objectives were to determine the effects of access to financial services, usage of financial services, quality of the products and the service delivery on stock market development in Kenya. The research was guided by Efficient Market Hypothesis theory. Using stratified random sampling, a sample size of 482 respondents was drawn from a target population. Multiple regression Model was employed to determine the relationship between financial inclusion and stock market participation in Kenya. There was a strong positive relationship between financial access, usage and product quality and stock market development. Most of the responses on advanced financial literacy questions were performed below average indicating low financial literate levels among the respondents. There is need for the National government to initiate programs that would enhance financial inclusion in the counties. This would not only enhance stock market development but also other market sectors. The Capital Markets Authority, which is tasked with supervision, licensing and monitoring the activities of market intermediaries should implement a comprehensive awareness and public education on the importance of investing in stock market.

Keywords: *Access to financial services, usage of financial services, quality of the products, service delivery and stock market development.*

MODERATING ROLE OF FUND SIZE ON THE RELATIONSHIP BETWEEN LOSS AVERSION AND PORTFOLIO FINANCIAL PERFORMANCE OF MUTUAL FUNDS IN KENYA

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Abstract

There has been an overall decline in the financial performance of mutual fund investments in Kenya in the recent past. It was essential to evaluate whether the portfolio performance pattern may be attributed to loss aversion. This study sought to ascertain the impact of loss aversion on financial performance and the degree to which fund size influenced the variables. A causal research design was utilized. Data was collected from a study panel. Secondary data was acquired from the prior financial statements of mutual funds over an eleven-year period, from 2011 to 2021. Stata software version 15 was employed for data analysis. The stationarity test, known as the unit root test, was conducted. Regression analysis involving panel data was executed. The validity and reliability of the data was evaluated by tests like the Hadri 2000 test, the Philips-Peron test, the Im- Pesaran and Shin test, the Augmented Dickey-Fuller test, and the Levin-Lin-Chu test. The Jarque-Bera test was used to assess normality. The Hausman test was used in distinguishing the fixed and random effects models. The variables were distributed normally, as shown by the skewness and kurtosis tests. Results showed that loss aversion statistically substantial on financial performance of mutual funds in Kenya with the regression coefficient of 0.0627506. Fund size with the regression value of- 0.008639 negatively moderated the study variables. Results of this study suggested that loss aversion significantly enhances the financial performance of mutual funds.

Keywords: *Loss aversion, mutual funds' portfolio financial performance, fund size, mutual funds, Kenya.*

THE PARADIM SHIFT TOWARDS SUSTAINABLE FINANCE: A REVIEW OF LITERATURE IN KENYA AND BEYOND.

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Abstract

Traditionally, the subject of finance is guided by principles such as maximization of shareholder returns, value for money, public sector, service delivery, risk management, budgetary control among others. These principles have however proven to be deficient because they have prioritized the growth and profitability of business entities at the expense of the surrounding environment and the society within which organizations exist. This has resulted in an unhealthy disequilibrium between the three components leading to unwanted phenomena such as climate change and expansion in social gaps. These realities have triggered a rethink about how financial resources should be deployed and introduced the subject of sustainable finance. Sustainable finance is concerned with taking due account of environmental, social and governance (ESG) considerations while making investment decisions. It strives to establish harmony between economic advancement, environmental preservation, and social fairness by considering how financial services contribute to a greener, more equitable, and sustainable future. Tied to the subject of sustainable finance is the concept of triple “P” bottom line both of which are believed to increase sustainability of economic activities and projects. This study seeks to review existing literature on this subject with a view to establishing the extent to which the concept of sustainable finance has been embraced by entities in Kenya and beyond. The outcome of this literature review will prepare the ground for a comprehensive study to assess the impact of sustainable finance on development projects in Kenya.

Keywords: *Sustainable finance, Triple “P” bottom line.*

IMPACT OF TECHNOLOGY ON THE PERFORMANCE OF HEALTH PRACTITIONERS IN PUBLIC HEALTH FACILITIES IN KIRINYAGA COUNTY, KENYA

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Abstract

Work-life integration, unlike conventional work-life balancing techniques, stresses seamless mixing of professional and personal duties, offering individuals more flexibility and control over their time. This study examined the impact of technology—specifically Electronic Health Records (EHRs), communication tools, and remote work capabilities—on the performance of health care practitioners in public health facilities in Kirinyaga County, Kenya. Guided by Social Exchange Theory, the study employed a descriptive research design, surveying 279 respondents from a population of 920. Data was collected through a 5-point Likert scale questionnaire. There was a strong positive correlation ($r = 0.845$) between technology and employee performance, with a coefficient of determination ($R^2 = 0.714$), indicating that technology accounts for 71.4% of variation in performance. Based on these findings, we recommend adopting and enhancing technology integration by emphasizing the use of EHRs, communication tools, and remote work capabilities. Regular training and assistance should be offered to ensure that healthcare practitioners properly employ these technologies. Future research should explore diverse healthcare settings, including private Level Five hospitals and other public and private hospitals to gain a broader and comparative perspective. Additionally, investigating the emerging role of teleworking in healthcare would provide valuable insights into evolving work environments. As healthcare institutions strive for excellence, investing in well-structured technological frameworks is essential to empowering medical professionals, improving patient care, and fostering a thriving work environment.

Keywords: *Work-life integration, technology, employee performance, electronic health records, communication tools, remote work, healthcare productivity.*

FINANCIAL INNOVATIONS AND SUSTAINABILITY OF COMMERCIAL BANKS IN KENYA.

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Abstract

Financial sector plays important roles in development of any country. Thus, commercial banks are key players in the financial sector and hence their performance is crucial to ensuring the growth of the economy. In Kenya, commercial banks performance has been declining and recently have been showing signs of financial distress. On the other hand, the Fintech with its financial products is however on the rise, threatening sustainability of commercial banks. The purpose of this study was to examining the influence of financial innovations on sustainability of commercial banks in Kenya. Specifically, the study focused on examining the influence of mobile money, agency banking, internet banking and mobile banking on sustainability of commercial banks. A descriptive survey research design guided the study. From a target population of 210 respondents, a sample of 120 was selected using a simple random sampling. In order to substantiate the responses from the commercial banks, information was randomly obtained from 384 users of financial innovations. Data was collected using self-administered questionnaires and document analysis. The study used two different questionnaires for the bank's employees and users of financial innovations. Data was cleaned, edited and analyzed with the help of SPSS (23) to establish whether the selected variables had any significant influence on sustainability of commercial banks. A regression model of financial innovation predictors was run against the indicators of sustainability to establish whether financial innovation has any significant influence on sustainability of commercial banks in Kenya. Results showed that agency banking, internet banking and mobile banking had a significant influence on sustainability of commercial banks while mobile money had negative insignificant influence. It was further established that government regulations did not have a significant moderating influence on sustainability of commercial banks. It was concluded that mobile money, agency banking, internet banking and mobile banking had significant influence on sustainability of commercial banks, but aggregation mobile money was insignificant. There is need for commercial banks to improve their internal operating efficiency to retain customers and consider increasing their working hours especially in major towns or areas with high number of business customers. Banks should also popularize internet banking among individuals since it is popular among corporations. Further research should focus on the possible influence on financial innovations on financial sustainability of other financial institutions such as SACCOs and micro-finances and to examine the influence of mobile banking and mobile money on capital growth and sustainability of listed banks in Kenya.

Keywords: *Financial innovation, agency banking, mobile banking, mobile money, financial sustainability and commercial banks.*

IMPACT OF INNOVATION AND ARTIFICIAL INTELLIGENCE ON KNOWLEDGE MANAGEMENT PRACTICES IN THE TELECOMMUNICATION SECTOR IN KENYA: A CASE OF AIRTEL KENYA

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Abstract

This study explored the impact of innovation and Artificial Intelligence (AI) on knowledge management (KM) practices within the telecommunications sector in Kenya, with a specific focus on Airtel Kenya. The study examined how AI-driven solutions influence three critical aspects of KM practices: cross-functional knowledge sharing, practical application of knowledge, and remote onboarding and learning. Adoption of AI technologies has the potential to revolutionize the way organizations like Airtel Kenya manage and utilize knowledge, enhancing organizational performance and competitive advantage. Through the application of the Technological-Organizational-Environmental (TOE) framework and the Knowledge-Based View (KBV) theory, this study investigated the technological, organizational, and environmental factors that influence integration of AI into knowledge management processes. A mixed-methods approach was employed, combining a survey of 150 employees at Airtel Kenya and qualitative interviews to collect quantitative and qualitative data. Data was analyzed using SPSS version 24, using descriptive statistics, correlation, and regression analysis to test the relationships between AI adoption and KM practices. There was a strong positive correlation between AI adoption and the three KM practices, with significant predictive power of AI on knowledge sharing ($r = 0.85$), practical application of KM ($r = 0.78$), and remote onboarding ($r = 0.82$). Regression analyses further confirmed that AI significantly enhances cross-functional knowledge sharing, supports real-time decision-making, and facilitates remote onboarding and learning by personalizing training and automating administrative tasks. It was concluded that AI adoption has a substantial positive impact on improving KM practices, fostering collaboration, enhancing decision-making, and transforming employee onboarding and development. There is need for continued investment in AI technologies, AI-powered platforms for collaboration, and training programs to maximize the potential of AI in knowledge management practices at Airtel Kenya. Further research is suggested to explore the long-term effects of AI on organizational culture and employee satisfaction.

Keywords: *Artificial intelligence, knowledge management, innovation, remote onboarding.*

INFLUENCE OF SOLID WASTE MANAGEMENT ON CUSTOMER SATISFACTION IN STAR-RATED HOTELS IN MT. KENYA REGION

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Abstract

The hospitality industry plays a significant role in global economic development and is a key contributor to employment and revenue generation. However, it is also a major source of environmental degradation due to its high levels of resource consumption and waste generation. Solid waste management (SWM) has become a crucial component of sustainable hotel operations, with increasing emphasis on green practices to enhance environmental conservation and improve customer satisfaction. This study examines the influence of solid waste management practices on customer satisfaction in star-rated hotels in the Mt. Kenya region. The study adopted a descriptive research design, targeting all 24-star-rated hotels in Nyeri, Laikipia, Embu, Meru, and Tharaka Nithi counties. Data was collected from 243 respondents, including hotel managers, housekeepers, and resident guests, using structured questionnaires. Data was analysed using SPSS Version 25, applying descriptive statistics, correlation analysis, and multiple regression models. Results showed that solid waste management practices have a significant positive impact on customer satisfaction ($\beta = 0.384$, $p = 0.001$), implying that better waste handling, recycling, and disposal mechanisms improve guest experiences. There is need for hotels to adopt a structured waste hierarchy model, investing in proper waste segregation, and implementing staff training programs to enhance solid waste management in hotels.

Keywords: *Solid waste management, customer satisfaction, green practices, sustainable hospitality, star-rated hotels.*

DETERMINANTS OF THE CHOICE OF MARKETING CHANNEL INTERMEDIARY FOR GREEN TEA LEAVES IN KIAMBU COUNTY, KENYA

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Abstract

Agricultural market liberalization aimed to boost competitiveness in commodity markets, with Kenya's tea sector initially seen as a success story under the Kenya Tea Development Authority (KTDA). However, by the early 1990s, smallholder farmers began advocating for market reforms to gain more influence on their produce. The government responded by transforming KTDA into a marketing agent and manager of small-scale tea farmers' factories. Despite this, the problem related to broker intermediary continues to challenge KTDA efforts of buying unprocessed tea leaves from small scale tea farmers, which has resulted in farmers being paid low prices and theft of unprocessed green tea leaves from farms. It has also resulted in low quantities of green tea leaves being delivered to KTDA despite its efforts to supply fertilizer and extension services to small-scale tea farmers. This study investigated the determinants of the choice of marketing channel intermediary of unprocessed green tea leaves in Kiambu County. Specifically, the study investigated the influences of; buyer practices, demographic characteristics, and farm characteristics on choice of marketing channel intermediary for fresh green tea levels in Kiambu County. A sample of 394 tea farmers from a target population of 25,624 tea farmers across five sub-counties: Githunguri, Gatundu North, Chania, Lari, and Gatundu South. The sample was determined using Yamane's formula, and data was collected using a structured questionnaire. The study was grounded on three theories: utilizing utility theory, bulk building theory and transaction cost theory. Descriptive statistics was used when analyzing profile of tea farmers, while inferential statistics, mainly binary logit regression analysis was used to reveal the nature of the relationship between explanatory variables and the choice of marketing channels. Buyer practices (credit terms, sorting methods and pricing) significantly affected the choice of marketing channels. Additionally, demographic factors and farm characteristics had a significant influence on farmers' choice of green tea leaves marketing channel. There is need for the government through KTDA to enhance strategies tailored towards addressing specific needs of different demographic groups, its buyer practices, and enhance market access for farmers. This would give it a more competitive edge compared to brokers, which will be of benefit to tea farmers.

Keywords: *Demographic factors, buyer characteristics, farmer characteristics and marketing channel intermediary*

CULTURAL AMBIDEXTERITY AND SUPPLY CHAIN RESILIENCE OF MULTINATIONALS IN KENYA

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Abstract

Multinational corporations in Kenya have faced many challenges with regard to cost control, operations inefficiencies, agility and technology adoption; factors which directly impact on supply chain resilience. The role of cultural ambidexterity on supply chain resilience of multinational organizations in Kenya therefore cannot be underrated. The specific objective of this study was to evaluate the effect of cultural flexibility on supply chain resilience of multinationals in Kenya. The research methodology followed a descriptive approach with a target population of 160 respondents, covering middle and senior management staff within multinational corporations operating in Kenya. A census survey was conducted on all the 5 multinational firms in Kenya. Data was analyzed by both descriptive and inferential statistics using statistical package for social sciences (SPSS Version 28). Descriptive statistics involved dispersion and central tendency measures. Inferential statistics on the other hand involved multiple regression analysis to establish the relationship between cultural ambidexterity and supply chain resilience. Results showed that cultural flexibility significantly affected supply chain resilience of multinational organizations in Kenya consequently, yielding a positive relationship in the regression model. Results of regression model indicated that cultural flexibility, significantly and positively affected supply chain resilience of multinationals in Kenya. There is need for management of multinationals in Kenya together with stakeholders to embrace a cultural approach in working with teams within their supply chain space to achieve supply chain resilience, efficiency, adaptability, agility, and business survival amidst dynamic challenging business environment.

Keywords: *Multinational, cultural ambidexterity, agility, supply chain resilience.*

EXAMINING THE ROLE OF UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY (UTAUT) IN THE USE OF MOBILE PAYMENT SYSTEMS IN KENYA

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Abstract

The purpose of this study was to examine the role of unified theory of Acceptance and use of technology (UTAUT) in the acceptance use of the mobile payment systems in Kenya. Kenya is the global leader in the usage of mobile payment systems and a study on the role of UTAUT variables in its success would help to understand the drivers of the mobile payment usage in Kenya. The study developed a conceptual framework containing five variables adopted from the unified theory of acceptance and use of technology (UTAUT) namely performance expectancy, effort expectancy, social influence, gender and age were tested in this study. The study developed a conceptual framework of the drivers that influenced the use of the mobile application. 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. Multiple regression analyses were used to test the research hypothesis. Results showed that performance expectancy, effort expectancy and age influenced the acceptance and usage of mobile payment systems in Kenya while gender and Social influence variables such as perceived image and social norms had little influence on the acceptance and use of mobile payment systems in Kenya. This research targeted mobile payment application and therefore more applications need to be studied before the results are generalized. With a huge disparity in the use of mobile payment services globally, a study focusing in Kenya which is the global leader in the consumer readiness and use would help understand how this theory can be applied and replicated.

Many previous studies have adopted the variables from technology adoption model (TAM) and theory of planned behavior (TPB) in their studies. This study goes further to examine the applicability of the theory of technology acceptance and use of technology in the mobile payment systems.

Keywords: *Mobile payment systems, social influence, performance expectancy, effort expectancy.*

INTEREST RATES VOLATILITY AND COMMERCIAL BANKS PROFITABILITY IN KENYA

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Abstract

This study aimed to empirically examine the relationship between commercial banks' profitability, interest rate volatility, and other macroeconomic factors in Kenya. Data was sourced from Central Bank of Kenya, World Development Indicators, Kenya National Bureau of Statistics and annual reports from banks. A descriptive research design was employed. Results revealed a positive correlation between real interest rates and performance of banks across all tiers. Money supply positively impacted profitability for banks in all tiers. Based on these findings, we recommend that the government, through the Central Bank of Kenya (CBK), should focus on implementing an effective monetary policy to stabilize the Central Bank rates, implement a more robust and adaptive monetary policy that can effectively manage interest rate volatility, ensuring stability in the banking sector and supporting consistent profitability across all bank tiers. The government should also encourage financial inclusion initiatives, ensuring that even smaller banks can better manage interest rate fluctuations and improve profitability by expanding access to financial services in underserved regions.

Keywords: *Interest rates volatility, commercial banks profitability, Kenya*

IMPACT OF TOURISM ON THE ECONOMY OF RWANDA: A CGE APPROACH

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Abstract

This study evaluates the economic impact of tourism in Rwanda for 2013/2014 using a Computable General Equilibrium (CGE) framework, advancing prior Social Accounting Matrix (SAM) methodologies. The CGE model integrates dynamic interactions such as price elasticity, labor mobility, and supply-demand equilibria to address SAM's limitations of static multipliers and excess capacity assumptions. Leveraging data from Rwanda's Tourism Satellite Accounts (TSA), EORA MRIO, and updated SAM tables, the analysis quantifies tourism's contributions to output, employment, labor income, and value addition. Results indicate that \$286 million in internal tourism expenditure generated \$803 million in output (7.1% of GDP), 698,000 jobs (12.5% of national employment) and \$381 million in value addition. However, tax revenue was reduced by \$8 million, while a 20% demand shock decreased GDP by 1.2% and triggered rural-to-urban labour migration. The CGE framework demonstrates that SAM overestimates multipliers by 3-5% due to rigid price and labor assumptions. By capturing second-round effects and sectoral interdependencies, this study provides policymakers with robust tools to balance tourism growth with equity and resilience. Future research should incorporate environmental externalities and refine rural-urban data. The transition to CGE underscores its superiority in modeling real-world constraints, offering critical insights for Rwanda's sustainable tourism strategies under the National Strategy for Transformation (NST-1).

Keywords: *Computable general equilibrium, tourism economics, Rwanda, dynamic multipliers, policy simulations.*

DETERMINANTS OF GREEN FDI ATTRACTION IN AFRICA: EVIDENCE FROM EASTERN AFRICA

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Abstract

According to the 2023 *Africa Attractiveness Report* by EY, in the recent past there has been macro-economic shifts in the world economy in terms of where foreign direct investment (FDI) is being directed. In the last two decades before the year 2022, ICT has been the greatest recipient of FDI. However, in the year 2022, CleanTech emerged as the leading FDI sector with the report identifying opportunities for healthcare, digital technology, renewable energy, and agriculture; Energy transition dominated FDI landscape as software slipped back. Africa is in dire need of FDI to supplement the little domestic investment that takes place because of her relatively low national savings rate. The available anecdotal evidence ranks Africa as the poorest recipient of FDI. Thus, in UNCTAD reported that Africa accounted for a paltry 3.5% of the global FDI 2022. Within the wider Africa, the Eastern region of the continent has been the poorest recipient of FDI. The EY report indicated that in the year 2022 the north and southern hubs of Africa were the key beneficiaries of Clean Tech which became the largest FDI recipient sector in the year, leading Africa's FDI for the first time. On the other hand, Eastern Africa lagged behind as the poorest recipient; However, within the Eastern Africa region there are wide disparities among the countries in terms of FDI performance. Given the continent's huge clean energy potential in both solar and wind energies, CleanTech and renewables are strongly positioned with the sector also generating sizable job opportunities. The purpose of this study was to investigate the factors affecting attraction of green FDI in Africa; a case study of Eastern Africa. The anchor theory in this study was the Eclectic theory. Quantitative research design was used and secondary data from EY, UNCTAD and world bank was applied. FDI data used was on project counts. The EY report showed that on a project count, CleanTech services accounted for more than half of Africa's total FDI in 2022. Results of this study are expected to provide actionable insights for African policy makers on how to craft effective policies that attract sustainable FDI. This is timely and essential as the continent transitions towards sustainable economic development.

Key words: *Green FDI, clean tech, determinants, Africa, Eastern Africa*

THE ROLE OF FORTIFIED TEA BASED FOOD PRODUCTS IN PROMOTING HEALTHY, INNOVATIVE AND SUSTAINABLE FOOD SYSTEMS IN KENYA

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Abstract

Tea (*Camellia sinensis*) beverages are the second most consumed drinks worldwide after water. They offer vast and affordable health benefits from their bioactive antioxidants polyphenols in addition to the natural appealing astringent taste. The United Nations General Assembly declared 21 May as International Tea Day, which celebrates the economic, social and cultural value of tea. Despite tea industry being one of the biggest drivers of Kenya's economy, it is currently facing challenges due to decline in sales, attributed mainly to changes in climatic conditions such as unpredictable and low rainfall, and also to bulk exporting through auctioning of processed black tea. According to the Tea Board of Kenya, one of the proposed focuses of averting the situation in the year 2025 is by increasing diversification of value added tea products and expanding tea markets. In order to revitalize Kenya's tea industry, there is a need to change the entire system from the processing and packaging technology, to adoption of modern consumer friendly digital marketing strategies. In line with the concept of sustainable food system innovations, the Food Science and Tea Institute of Karatina University has embarked on a projects aimed at developing fortified nutritious tea based food products using locally available indigenous fruits/ vegetables and herbs such as dragon fruits, amaranth, ginger, lemon, moringa and hibiscus. These fortified tea products include fermented probiotic yoghurts /kombucha tea, purple- leaf tea sports drinks and cakes are tested for proximate composition, vitamins and mineral salts with potential to alleviate micronutrient malnutrition and promote gut health. By product diversification would potentially job opportunities and generate income in the production factories. These innovations can reshape and expand the tea marketing strategy from the centralized large scale auctioning to a robust system that accommodates the Small and Medium Enterprises (SMEs).

Keywords: *Tea fortification, healthy foods, innovative technology and sustainable food systems.*

EFFECT OF TYPE OF CRIME SCENE ON LATENT FINGERPRINT PROCESSING IN CRIMINAL INVESTIGATIONS IN KENYA.

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Abstract

Fingerprints are one of the most valuable and robust forensic evidence, extensively accepted as a major identification tool in forensic and criminal investigations. Identification and classification of fingerprints from a surface in a crime scene determines the success of a criminal investigation or forensic analysis. Latent or invisible fingerprints processing is an essential part in any criminal investigations. There are hardly any studies focusing on relationship of crime scene type and latent fingerprint processing in crime investigations in Kenya. This study used a cross-sectional research survey and mixed methods approach. A semi-structured questionnaire was used for primary data collection. Data was analyzed using descriptive and statistical analysis. The total number of respondents was 205. Data was analyzed using descriptive and inferential analyses and Confirmatory Factor Analysis (CFA). This study established that the type of crime scene significantly influences the outcomes of criminal investigations, in that identification of the crime scene as either indoor, outdoor, primary or secondary and knowing the technique to use is critical to good outcomes in criminal investigations. The study also established that many University graduates lacked the knowledge in latent fingerprint processing, and that the chemicals used in latent fingerprint processing posed a health risk to the analysts or investigators. Identifying the type of crime scene during latent fingerprint processing is key to a successful criminal investigation. There is need for investigators to support the practice of processing mock crime scenes for latent fingerprints in order to develop and refine skills in evidence identification and collection. There is also need to consider using organic based fingerprint powders while Institutions of higher learning should consider having laboratory practical sessions for criminology and forensic science students in Kenya.

Keywords: *Outdoor crime scene, indoor crime scene, latent fingerprints processing, forensic investigation.*

ENVIRONMENTAL ACTIVITIES AND PERFORMANCE OF LISTED COMMERCIAL BANKS IN KENYA

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Abstract

Corporate social responsibility has grown from being a nice undertaking that organizations engaged in into a necessity for business survival. Corporate Social Responsibility (CSR) programs have found its roots in corporate philanthropy. This study sought to establish the effect of environmental activities on the financial performance of listed commercial banks in Kenya. It sought to determine the effect of corporate social responsibility on the financial performance of listed commercial banks in Kenya. Though several variables were studied, this study concentrated on the effect of environmental activities on the financial performance of listed commercial banks in Kenya. The study was guided by the stakeholder Theory. The study used a longitudinal research design covering the periods 2016-2020, to explain how investing in CSR activities affect financial performance of banks and adopted a correlational research design. Stratified random sampling technique was used to select study participants from the total population of 42 commercial banks in Kenya. Participants comprised 11 banks listed at the Nairobi Stock Exchange. A questionnaire was the primary data gathering instrument in the study. The questionnaire was prepared based on the independent variable and dependent variable (financial performance). Data was analyzed using SPSS version 23.0 software. Inferential statistics in the form of linear regression and paired t-tests was used to analyze the data. The results were presented in the form of tables, pie charts and graphs. Results showed that environmental activities had a positive and significant effect on financial performance of commercial banks in Kenya.

Keywords: *Environmental activities, financial performance, corporate social responsibility.*

EFFECTS OF POPULATION GROWTH ON URBAN INFRASTRUCTURE AND SERVICES: A CASE OF NAKURU CITY, KENYA

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Abstract

Globally, increase in urban population is inevitable due to supposed better life opportunities compared to the rural areas. This study, sought to put into perspective impacts of population growth on infrastructure, water supply and sewage disposal in Nakuru City, Kenya. The study applied descriptive study design. The study acquired qualitative and quantitative data from 185 respondents who included 130 household representatives, 50 businesses and 5 institutions. Simple random sampling technique was adopted in picking households for inclusion in the study while purposive sampling was used to identify institutions and businesses. Interview guides, questionnaires, in depth group discussions and observation methods were used to collect data. Data was subjected to descriptive statistics to determine existing relationships between the predictor and the outcome variables. Results were further subjected to inferential statistics to establish if the relationships were significant. Data was analyzed using SPSS and Microsoft Excel programs. Descriptive analysis generated outputs that were illustrated using percentages and bar graphs among others. Inferential statistics analysis for the three objectives revealed significant relationships: Objective one; ($\chi^2 = 90.54, df=1, p=0.000$), objective two; ($\chi^2 = 109.4, df=1, p=0.000$) and objective three; ($\chi^2 = 38.55, df=1, 0.000$). Nagelkerke R^2 model for the variables obtained a value of 0.928 meaning that the predictor variable explained 92.8% of the status of infrastructure, water supply and sewage services in the city. It was observed that increasing population size in the city is causing strain on infrastructure, water supply and sewage disposal. There is an increasing recognition that population growth in Nakuru City is inevitable. This study recommends effective urban planning, infrastructure development and management to cope with the increasing population in the city.

Keywords: *Population growth, urban infrastructure and services, Nakuru City, Kenya.*

ENVIRONMENTAL ACTIVITIES AND PERFORMANCE OF LISTED COMMERCIAL BANKS IN KENYA

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Abstract

Corporate social responsibility has grown from being a nice undertaking that organizations engaged in into a necessity for business survival. Corporate Social Responsibility (CSR) programs have found its roots in corporate philanthropy. This study sought to establish the effect of environmental activities on the financial performance of listed commercial banks in Kenya. It sought to determine the effect of corporate social responsibility on the financial performance of listed commercial banks in Kenya. Though several variables were studied, this study concentrated on the effect of environmental activities on the financial performance of listed commercial banks in Kenya. The study was guided by the stakeholder theory. The study used a longitudinal research design covering the periods 2016-2020, to explain how investing in CSR activities affect financial performance of banks and adopted a correlational research design. Stratified random sampling technique was used to select study participants from the total population of 42 commercial banks in Kenya. Participants comprised 11 banks listed at the Nairobi Stock Exchange. A questionnaire was the primary data gathering instrument in the study. The questionnaire was prepared based on the independent variable and dependent variable (financial performance). Data was analyzed using SPSS version 23.0 software. Inferential statistics in the form of linear regression and paired t-tests was used to analyze the data. The results were presented in the form of tables, pie charts and graphs. Results showed that environmental activities had a positive and significant effect on financial performance of commercial banks in Kenya.

Keywords: *Environmental activities; financial performance; corporate social responsibility.*

A REVIEW OF EMPIRICAL LITERATURE ON CREATIVE ACCOUNTING

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Abstract

This paper explores the subject of creative accounting, an area involving the manipulation of financial statements to present a favorable image of an organization's financial position. The use of unstandardized ways of accounting has led to various scandals in organizations. Generally creative accounting is viewed negatively from the accounting view, but there are some writers who find it necessary to use creative accounting since it responds to the needs of their customers. While it may be legal, creative accounting raises concerns about transparency, fairness, and the potential for unethical behavior. In this paper the researchers are analyzing the definition of creative accounting, the rationale for creative accounting, the perception of creative accounting whether positively or negatively viewed and the implications of creative accounting. The study is conducted through a review of the published articles. Creative accounting has gained increasing attention due to its potential for abuse, which has led to the collapse of firms and financial scandals like Enron. The study aims to show light on how such practices occur and what can be done to mitigate them.

Keywords: *Creative accounting.*

INFLUENCE OF COMMERCIAL BANKS' WEIGHTED INTEREST RATE ON CONSTRUCTION INDUSTRY GROWTH RATE IN KENYA

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Abstract

The importance of the construction industry in any economy cannot be overemphasized. This is due to the major role played by this industry in building construction, dam construction and many other major infrastructure developments in the economy. In Kenya, this industry is quite indispensable. Over and above the above-stated roles, it is also a major contributor to the country's gross domestic product (GDP). In line with this, the researcher herein undertook to establish whether the industry's growth rate is affected by interest rates due to its heavy reliance on borrowed funds. To achieve this goal, the study utilized data which were collected from the Kenya National Bureau of Statistics (KNBS) and the Central Bank of Kenya (CBK). The Time Series data was collected using an abstraction sheet for two variables; Construction Output Growth Rate (COGR) and Commercial Banks's Weighted Interest Rate (CBWR) for 48 years (1977 - 2024). Data analysis was carried out using EViews software version 10. The analysis was done in three ways which included graphical, correlation and regression analysis. The results from the three (3) data analysis methods were similar in that the construction industry output growth rate is impacted by commercial banks' interest rates. Graphically, it is observed that if CBR rises, COGR drops, even though not immediately. Correlation analysis showed that COGR and CBWR are inversely correlated with a coefficient (r) of -0.336. Finally, the first differences of COGR were regressed on the first differences of CBWR and gave an R^2 value of 0.000074 in the current year. But when COGR is regressed on lagged CBWR by one (1) year up to thirteen (13) years, the R^2 value changed to 0.365 with a regression coefficient (β) of -0.481438 indicating that COGR is negatively impacted by CBWR, but not in the current year but much later. These findings therefore can be used to inform policy formulation for the construction industry growth in Kenya.

Keywords: *Construction industry output, time series, first differences.*

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