



BOMET UNIVERSITY COLLEGE
(A Constituent College of Moi University)

THE 1st INTERNATIONAL CONFERENCE

PROGRAMME AND BOOK OF ABSTRACTS

THEME

TOWARDS A SUSTAINABLE GREEN ECONOMY

CONFERENCE DATES

13TH TO 14TH JULY 2021

VENUE

VIRTUAL PLATFORM, BOMET UNIVERSITY COLLEGE, KENYA

PREAMBLE

Bomet University College (BUC) is the first public University in Bomet County. Its establishment is a step towards realization of a fully-fledged University in line with the government policy to establish at least one University in every County. The University College was mandated as a Constituent College of Moi University through the Legal Order No. 145 Gazetted on 27th July, 2017.

INTRODUCTION

Being the first and only public University in Bomet County, Bomet University College (BUC) was established as a Constituent College of Moi University through the Legal Notice No. 145 published in the

Kenya Gazette Supplement No. 114 of 27th July, 2017. Its establishment was driven by the Government's vision in line with the Kenya Constitution, 2010 to have at least one University in every County. The University College plays a major role in increasing access to quality university education and is positioning itself in its quest to become a fully-fledged University. The University College is expected to empower the region, country and the international community through quality teaching and learning, research, innovation, digital transformation and dissemination of output in outreach Programmes that support the United Nation's Sustainable Development Goals, the Constitution of Kenya 2010, Kenya's Vision 2030 and the Government's Big Four Agenda.

1.1 Mandate

The mandate of the University College is to provide university education through teaching, research and outreach.

1.2 Vision

To be a premier Green University in fostering research excellence in Science, Technology and Innovation for sustainability.

1.3 Mission

To provide a conducive environment for discovery, preservation and dissemination of knowledge; to nurture critical inquiry, creativity and engagement for social transformation and advancement of humanity.

1.4 Niche

Green Economy for Sustainability

1.5 University Motto

Green University for Sustainability

1.6 Core Values

Bomet University College is a community built upon the valued relationships among students, staff, faculty, alumni, government and other stakeholders. At the core of these relationships are BUC core values that lead to the realization of corporate culture and good governance. These are:

- i. **Integrity:** Consistency in service delivery through adherence to highest ethical standards.
- ii. **Patriotism:** To render selfless services and unwavering commitment to the University.
- iii. **Transparency and Accountability:** To maintain a culture of openness, fairness, equity, and assume and demonstrate responsibility over our individual and collective actions.

- iv. **Respect:** For diversity and the dignity of the individual, as well as attaching a premium to the contributions of each and every player regardless of one's status in the University.
- v. **Commitment:** To continuously improve on the quality of the services offered with the goal of assuring longevity and excellence of the University.

CONFERENCE COMMITTEE

Prof. George Orwa	-	Conference Coordinator/Management Representative
Prof. Fredrick Kengara	-	Chairman
Prof. Patrick Ojera	-	Co-Chairman
Dr. Johnmark Obura	-	In-Charge of Secretariat
Dr. Tony Okwach	-	Member
Dr. Suleiman Chembea	-	Member
Dr. Richard Rotich	-	Member
Dr. Adolphus Wagala	-	Member
Dr. Clement Nkaabu	-	Member
Dr. John Wayong'o	-	Member
Mr. Richard Kirui	-	Member
Ms. Caroline Onywany	-	Member
Ms. Josephine Agadah	-	Member
Mr. Mathew Ng'eno	-	Member
Mr. Elisha Kirui	-	Member
Mr. Edwinson Wekesa	-	Member
Ms. Dina Wechuli	-	Secretariat
Ms. Michelina Echwa	-	Secretariat
Ms. Gwendolyne Machira	-	Secretariat

MESSAGE FROM THE PRINCIPAL

PROF. ANNE NANGULU

PRINCIPAL, BOMET UNIVERSITY COLLEGE



First and foremost, I wish to acknowledge the Ministry of Education, steered by the Cabinet Secretary, Prof. George Magoha; Principal Secretary, State Department for University Education and Research, Amb. Simon Nabukwesi, Chief Administrative Secretary, Ministry of Education; for the support accorded to Bomet University College (A Constituent College of Moi

University).

I wish also to acknowledge the support of Bomet University College Council; Moi University Senate, and the Vice Chancellor, Prof Isaac Kosgey, for the mentorship and the support granted to BUC to execute its core mandate to offer University Education. I acknowledge the input of the Chief Guest, Amb. Eyal David – Israeli Deputy Ambassador to Kenya; the Keynote Speakers, Prof. Hamadi Iddi Boga, Prof Shem Wandiga, Mr. Peter Odhengo, Dr. Moses Mwangi Thiga and Prof. Jackson K. Too; for the great intellectual contribution put forth towards the success of this Conference.

It is a great pleasure for me to welcome all Participants, invited Guests and Stakeholders virtually to Bomet University College. I take this opportunity to also thank you for participating in this first ever International Conference for Bomet University College.

The Theme of the Conference: **“Towards a Sustainable Green Economy”**, is in line with the Vision of BUC: “To be a Premier Green University in fostering Research Excellence in Science, Technology and Innovation for sustainability”; and the University College’s Niche: **“Green Economy for Sustainability”**. This is equally aligned to the BUC Motto, **“Green University for Sustainability”**

The Conference is being held against the backdrop of the adverse effects of Coronavirus (COVID-19) Global Pandemic on almost all spheres of life of Kenyans. The Management of BUC has encouraged Staff and Students to make use of e-Resources, Use of ERP (Enterprise Resource Planning), similarly, there are several endeavours to have e-connections, partnerships and collaborations for most of BUC activities. Further, it is important to mention that the University College takes seriously the health and safety of Staff and Students, to this end, pedagogical innovations like up-to-date ICT infra-structure have enabled Blended Learning even in the middle of the Coronavirus (COVID-19) Global Pandemic.

Complementing and integrating tenets of the **“Green Concept”** in the political, economic, social and cultural realm of society will improve livelihoods, conserve the environment for the benefit of the present and future generations, while enhancing life on earth for sustainable development locally and globally.

The Conference will focus on emerging educational issues for Kenya as the country undertakes educational reforms geared towards the Competency Based Curriculum (CBC). Also, of importance will be science and technology, agriculture, environment and natural resources, the next business frontier and sustainable governance and stewardship. This Conference presents an ideal opportunity for dissemination of knowledge and technology transfer.

I am grateful to everyone for being part of this International Conference, please take a moment to also visit BUC Schools and Departmental Websites, and keep up with all our activities.

Therefore, I seize this chance, on behalf of the BUC family to welcome you virtually to this Conference as I look forward to a very interactive and successful forum; and present and future collaborations and partnership, in enhancing BUC institutional Niche: “**Green Economy for Sustainability**”.

MESSAGE FROM THE DEPUTY PRINCIPAL (ACADEMIC & STUDENT AFFAIRS)



PROF. GEORGE OTIENO ORWA
DEPUTY PRINCIPAL (ACADEMIC AND STUDENT AFFAIRS)

It is a great pleasure to be part of 1stBomet University College (BUC) International Conference. This Conference comes at a time when the Globe is facing the COVID-19 Pandemic that has led to Universities Worldwide adopting new methods of content delivery. Indeed the theme of this Conference “*Towards Sustainable Green Economy,*” together with the University College Niche: “*Green Economy for Sustainability,*” are in line with the emerging Global Trends. The University College has put in place measures to enhance excellence in Teaching, Training, and Learning as well as encouraging Innovation. We have adopted appropriate Technologies and currently implementing blended methods of Teaching, Training, Learning, and Research in compliance with prevailing circumstances. Moreover, the University College has implemented an Enterprise Resource Planning (ERP) System which has automated BUC processes and enhanced Quality Assurance in Teaching, Training, Learning, Research, Outreach and Innovation. The University College has put in place a Common Course “*Greening for Sustainability*” undertaken by all students to prepare them for the new normal and inculcate in them the culture of job creators rather than job seekers in their respective disciplines. The University College has also developed a robust Funds and Grants Policy that has provided a vibrant intellectual climate for quality research, innovation, dissemination, and knowledge transfer. Ladies and Gentlemen, I therefore congratulate you on your participation in this Inaugural Conference and wish all of you fruitful deliberations during the conference.

MESSAGE FROM THE DEPUTY PRINCIPAL (ADMINISTRATION AND FINANCE)



PROF. LOICE CHEMNGETCH MARU DEPUTY PRINCIPAL (ADMINISTRATION AND FINANCE)

It is with great honour to be part of this inaugural 1stBometUniversity College International Conference whose main theme “*Towards A Sustainable Green Economy*” comes in handy during the current *new normal* caused by the Coronavirus COVID-19 Global Pandemic. Coupled with the implementation of the University College Niche -*Green Economy for Sustainability*, the Conference is a necessity for scholars to chart a common front for the *new normal*. This Conference provides an opportunity to scholars to rethink Innovative ways of Teaching, Learning, Research, and running other operations through Digital Transformation towards actualization of the Mandate of Bomet University College (BUC).

Coincidentally, these Innovations contribute to integration of the Niche in the functions and activities of the University College, and at the same time, ensure compliance with the COVID-19 Global Pandemic Protocols. In the real sense, they contribute to *a Green University for Sustainability* as carried in the Motto of BUC.

Ladies and Gentlemen, it is my pleasure to report that the Bomet University College has made strides towards achieving its Niche through implementation of the Strategic Objectives engrained in its five (5) year Strategic Plan (2018-2023), whose Review is nearing completion. These Strategic Objectives are well aligned to the National Agenda as espoused in the Vision 2030, Medium Term Plan III (2018-2022), the Big Four Agenda and the emerging issues as directed by the Government through its Ministries and relevant Agencies from time to time.

Specifically, Bomet University College (BUC) has Recruited and Appointed competent staff who are critical in undertaking both Teaching and Research across its four (4) Schools. Moreover, BUC has fully embraced ICT infrastructure that has enabled implementation of; Blended Learning, automation of processes using the Enterprise Resource Program (ERP) system, a vibrant institutional website that facilitate e-communication internally and externally; and thus accelerating the move to paperless work environment. These Innovations have not only helped BUC to deal with compliance with the stipulated COVID-19 Global Pandemic protocols; but also compliment the *green* concept.

To ensure compliance with its Niche, BUC has incorporated in its building designs provisions for use of natural resources, such as, lighting through widely spaced windows, tapping of solar energy to complement the existing power supply from main national grid; wide corridors to allow adequate aeration and ventilation; harvesting of rain water. Also, in a bid to expand space for Teaching and Research, BUC has continually refocused its internal resources to establish critical facilities such as the Research Centre and Start-Up, whose construction is on-going. These innovations are geared towards achieving *green* infrastructure for sustainable operations in BUC. Furthermore, the University College has also prioritized planting of Tree Seedling to enhance forest cover in its parcels of land, and thus contribute to the National and Global Greening agenda. The University College has successfully engaged with its stakeholders in undertaking this noble greening activity.

Ladies and Gentlemen, your participation in this Conference is indeed a confirmation of your commitment towards making our beloved Country and the World, a *Green Economy for Sustainability*. It is my wish that by the end of the Conference, we will come up with a common sustainable front to tackle the myriad of challenges facing our economy as a result of the COVID-19 Pandemic.

MESSAGE FROM THE CHAIRMAN OF THE CONFERENCE COMMITTEE



PROF. FREDRICK ORORI KENGARA

The current challenges bedeviling the globe are as numerous as they are complex. From global warming - and other aspects of climate change - to depletion of natural resources, we are staring at an uncertain future in an increasingly encumbered planet. This state of affairs is not suffered to go for long without serious detrimental ramifications. There is therefore an urgent and immediate demand for a radical paradigm shift in the way that we utilize our planet and her resources. But maybe it is also time to ask ourselves why and how we got here in the first place – because only by understanding this, will we be able to navigate our way forward into a better future. That our planet has gotten to its present state courtesy of the

linear economy is not in doubt. What is in doubt is how best we can structure our activities and affairs to make our economy more sustainable. That is where the green economy comes in – and that is the core purpose of the BUC inaugural conference.

This conference hopes to explore how and why cyclic economic systems – upon which the green economy is premised – offer a panacea to the ravages occasioned by the linear economy, and offer a way into a sustainable future. It looks at emerging innovations and technologies, and how they can be best harnessed to efficiently address the needs of humanity and other life forms, while preserving our planet. The conference further interrogates the capacity of our present education systems to produce the required human resource for the green economic frontier – and delves into novel pedagogical technologies that help in imparting and educating the necessary skill sets such as critical thinking and creativity. Moreover, the conference seeks to explore the socio-economic impacts of the greening process, as well as measures and strategies of leveraging on this transformation – while mitigating any unintended repercussions. Finally, the conference highlights the policies and structures necessary for the successful greening of an economy.

We hope that the command of the conference will be that *the green step forward* is the best way forward because - to quote Ban Ki Moon - “*Sustainable development is the pathway to the future we want for all. It offers a framework to generate economic growth, achieve social justice, exercise environmental stewardship and strengthen governance.*”

Therefore, on behalf of the Organizing Committee, it is my singular pleasure to welcome you all to the 1st Bomet University College International Conference. This inaugural conference is on a virtual platform in tandem with the COVID-19 containment protocols. Nevertheless, it is our hope that your experience will be truly worthy of your aspirations and expectations of attending the conference.

THE CONFERENCE SECRETARIAT



Dr. John Mark Obura, PhD
Senior Lecturer, Finance
In Charge Secretariat



Ms. Dinah Ayoma Wechuli
Research Assistant



**Ms. Michelina Echwa
Ewoi**
Research Assistant



**Ms. Gwendolyne Wanjiku
Machira**
Research Assistant

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CHIEF GUESTS



**AMB. SIMON NABUKWESI
PRINCIPAL SECRETARY, STATE DEPARTMENT OF
UNIVERSITY EDUCATION AND RESEARCH**

Amb. Simon Nabukwesi is the Principal Secretary, State Department of University Education and Research. He holds a B.Ed, M. Ed. in Education Planning and Management and MA in International Project Management. He is a PhD Candidate in International Project Management. In addition to this, he has a Diploma Level training in Institutional Management from Hiroshima University, Japan and a Pre-university Training from the National Youth Service (1986).

With this training, Simon has had a successful career as a High School Teacher, as a Deputy Principal and Principal in a span of twenty years (1989-2009). He has also served as Kenya's High Commissioner to Canada and Ambassador Plenipotentiary and Extra-ordinary to Cuba. His eleven (11) years of service as a diplomat included being the Director of Foreign Service Institute which he worked to transform into the Foreign Service Academy for training Junior Diplomats, Middle level Diplomats, Senior Diplomats and eight (8) Cohorts of Ambassadors whom he took through induction courses. The Foreign Service Academy served as a soft power tool for the government by training diplomats and ambassadors from the Eastern, Central and Southern Africa in addition to coordination of scholarships from friendly nations. This made members of the Association of Directors of Foreign Service Academies from the IGAD Region to vote Nabukwesi to be their Chairperson, from 2016 to 2019 when he left the Academy to head Europe and Commonwealth Directorate in the Ministry of Foreign Affairs.

Amb. Nabukwesi was appointed to the position of Principal Secretary, State Department of University Education and Research with effect from 28th February, 2020. He is optimistic about working with all stakeholders to improve University Education and Research.

**EYAL DAVID
ISRAELI DEPUTY AMBASSADOR TO KENYA**



Eyal David is the Deputy Ambassador of Israeli in Nairobi, accredited to Kenya, Uganda, Tanzania, Malawi, Seychelles, and to the UN organizations based in Nairobi since August 2018. Prior to joining the Ministry of Foreign Affairs in Israeli Eyal was a researcher of Jewish communities in the Middle East and North Africa. Eyal has an MA in Islamic and Middle Eastern Studies and BA in both International Relations and in Islamic and Middle Eastern Studies.

KEYNOTE SPEAKERS

PROF. HAMADI IDDI BOGA



Prof. Hamadi Iddi Boga is the Principal Secretary of the State Department for Agricultural Research in the Ministry of Agriculture, Livestock, Fisheries and Irrigation in the Government of Kenya. He is the former founding Principal of Taita Taveta University and was its Vice Chancellor between 2007 and 2017. He was a Professor in the department of Botany at the Jomo Kenyatta University of Agriculture and Technology. His skills and interests are in biology, agricultural science, sequencing, microbiology, molecular biological techniques and RNA genes. He also has an interest in microbial ecology of insects' guts, soils and soda lakes and has worked with termites, the soda lakes of Kenya, mangrove swamps, agricultural and forest soils and also on Mount Kenya glacier. He has a PhD in Biology from Universität Konstanz in Germany.

PROF SHEM WANDIGA



Prof. Wandiga was born in Karachuonyo, South Nyanza District in 1939. He received his early education at Kamagambo School in his home district and at the Pine Forge Institute, Pennsylvania. He received his B.Sc., M.Sc. and Ph.D degrees at Howard, Maryland and Case universities respectively. He joined the Department of Chemistry at the University of Nairobi in 1972, where he has held responsible position like Chairman and Professor of Chemistry. He is a member of many national and international scientific organizations including, Chairman, Natural Sciences Committee of the Kenya National Commission of UNESCO, a Member of the International Society for Trace Element Research in Humans and Coordinate of the Eastern and Southern Africa Environmental Chemistry Network.

Prof. Wandiga has had a long standing research interest in Coordination Chemistry, and Environmental and Pollution Chemistry. He has to date published over 40 scientific papers mainly in the area of coordination and analytical chemistry. His studies of heavy metal content in living specimens have revealed moderate to high concentrations in Kenya Human hair. However, the concentration of these metals in the tissues of fish from the Winam Gulf of Lake Victoria and Indian Ocean are low. Similarly, the metals concentration in the lakes of Kenya water and sediments are low. His recent achievement involves the identification of termites as a major biological source of methane and carbon dioxide emission of the tropics feeding on fungus combs and soil do emit methane and carbon dioxide as do lower termites.

MR. PETER ODHENGO

(Senior Policy Advisor Climate Finance/Green Climate Fund NDA, National Treasury and Director, GKIT)



Peter Oluoch Odhengo, holds Masters of Science in Environmental Protection and Sustainable Development, Bachelor Science in Ecology, Post graduate Certificates:- in Wind Energy Management, Sustainable Water Resources Management, Energy and Technology Life Cycle Assessment is currently Senior Policy Advisor on Climate Finance at the National Treasury and the founding Director of Greening Kenya Initiative Trust-a Public-Private-Partnership initiative whose mission is to promote green consumerism through diffusion of green technologies for the advancement of green economy in Kenya.

DR. MOSES MWANGI THIGA



Dr Moses M Thiga is a Senior Lecturer in information Technology at Kabarak University. In this capacity he is involved in Teaching, Research and Community Outreach. Currently, Dr. Thiga is the Director, Kabarak University Online and Director, Research, Innovation and Outreach. He has also been an Acting Director, Post graduate Studies and Research. He has a PhD in Information Systems. His PhD Thesis was “A Location-based SMS and USSD Model for Mobile Advertising in Microenterprises.” He has an M. Sc. in Information Systems Management from Liverpool University, M.Sc. Statistics from Egerton University and a Bachelor of Computer Science from

Egerton University where he graduated with a First Class Honors.

PROF. JACKSON K. TOO



Prof. Jackson Too holds B.Ed., M.Phil, Ph.D from Moi University. He is an Associate Professor of Educational Communicational and Technology, specializing in instructional media, pedagogy and technology with a track record of teaching, research and administration. His research interest is in mediated learning. He is a member of the Commonwealth Association of Educational Administration and Management (CAEAM). Member of East and Southern African-German Centre of Excellence for Educational Research Methodologies and management (CERM-ESA). He is also a Project Leader for Partnership for

Enhanced Blended Learning (PEBL) whose objective is to develop modules for online learning. His work experience spans over twenty years as a teacher in High School, National Polytechnic, Moi University and Commission for University Education. He is an External Examiner of the University of Dares Salaam, Nelson Mandela Metropolitan University (NMMU), (SA) and University of Eastern Africa among others. He served in the Task Force on Enhancing Access, Relevance, Transition, Equity and Quality for Effective Curriculum Reforms.

CONFERENCE PROGRAMME

1ST BOMET UNIVERSITY COLLEGE INTERNATIONAL CONFERENCE

TUESDAY 13TH JULY 2021 TO 14TH JULY 2021

TIME	DAY 1: TUESDAY 13 TH JULY 2021	RESPONSIBILITY
8. 00- 8.30AM	Log in and Registration	Secretariat and Committee Members
8.30-11.00AM	OFFICIAL OPENING CEREMONY	
	Opening Prayer/Introduction of Participants.	Prof. Fredrick Kengara
	Welcoming Remarks by Prof. George Orwa, Deputy Principal (Academic & Students Affairs) who will invite Prof. Loice Maru, Deputy Principal (Administration & Finance) and Prof. Anne Nangulu, Principal, Bomet University College to give their welcoming remarks	Prof. George Orwa
	Welcoming Remarks by Prof. Anne Nangulu, Principal, Bomet University College who will then introduce Key Note Speakers and Guests. The Principal will invite the Deputy Vice Chancellors of Moi University to give their remarks The Principal will invite the Vice Chancellor, Moi University and Chief Guests to make their remarks.	Prof. Anne Nangulu
	Remarks by Prof. Isaac Koskey, Vice Chancellor, Moi University	Prof. Anne Nangulu
	Remarks by Amb. Simon Nabukwesi, the Principal Secretary, State Department of University Education and Research	Prof. Anne Nangulu
	Remarks by His Excellency the Deputy Amb. Eyal David, to address the conference and officially open the 1 st Bomet University College International Annual Conference.	Prof. Anne Nangulu
11.00-11.30AM	HEALTH BREAK	Ms. Caroline Onywany
11.30-12.00PM	“Greening Bomet University” Keynote Address by PROF. ANNE NANGULU	Prof. George Orwa

12.00-12.30 PM	“Policy Changes Towards Greening in Science, Agriculture and Environment” Keynote Address By PROF. HAMADI BOGA, Principal Secretary, Ministry of Agriculture, Livestock, Fisheries and Cooperatives	Prof. Anne Nangulu
12.30-1.00PM	“Build Back a Better Kenya and Africa” Keynote Address by PROF. SHEM WANDIGA, Professor of Chemistry, University of Nairobi	Prof. Anne Nangulu
1.00-1.30PM	Plenary	Prof. Loice Maru
1.30-2.00PM	LUNCH BREAK	Mr. Edwinson Wekesa
TIME	DAY 2: WEDNESDAY 14TH JULY 2021	RESPONSIBILITY
8. 00- 8.30AM	Log in and Registration/ Prayer	Secretariat and Committee Members
8.30-9.00AM	“Curriculum Reforms and Innovation for 21st Century and Beyond” Keynote Address By PROF. JACKSON TOO	Dr. Tony Okwach
9.00-9.30AM	“Sustainable Climate Financing: Securing the Environment for the Current and Future Generations” Keynote Address by MR. PETER ODHENGO	Prof. Patrick Ojera
9.30-10.00AM	“Harnessing Artificial Intelligence for the Earth” Keynote Address by DR. MOSES MWANGI THIGA	Dr. Adolphus Wagala
10.00-10.30AM	PLENARY	Prof. George Orwa
10.30-11.00 AM	HEALTH BREAK	Ms. Caroline Onywany
DAY 2: WEDNESDAY 14TH JULY 2021: OFFICIAL CLOSING CEREMONY		
4.00-5.30PM	Conference Recap and Ways Forward:	Prof. George Orwa
	Remarks by one Participant-Dr. Jane Opiri	
	Closing Remarks by Prof. Fredrick Kengara	
	Closing Address by Prof. Anne Nangulu	
	Speech and official closing of 1 st Bomet University College Conference by Prof. Isaac Kosgey, Vice Chancellor Moi University	

SUB THEME: EDUCATION FOR 21ST CENTURY AND BEYOND
DAY 1: TUESDAY, 13TH JULY 2021 VENUE: SUB THEME VIRTUAL PLATFORM

TIME	PRESENTATION	RESPONSIBILITY
2.00-2.20PM	Bernard Chemwei (Kirinyaga University, Kenya). Relationship between Tutor Confidence and ICT Integration in Primary Teacher Training Colleges in Kenya	Dr. John Momanyi
2.20-2.40PM	Richard Maite Sigilai (Bomet University College, Kenya). Integrated Principal Leadership on School Climate for Pedagogical Quality among Selected Public Secondary Schools in Nakuru County, Kenya	
2.40-3.00PM	Mettoh Jepchirchir Hellen (Bomet University College, Kenya). Students' Opinion on School Rules and Regulations as a Governing Tool: A Case Study of A Peri-Urban Mixed Secondary School in North-Rift Kenya	
3.00-3.20PM	Polycarp Muchesia Ishenyi (Bomet University College, Bomet, Kenya). Mathematics Teachers' Content knowledge and Discourse: Effects on Students' Achievement in Mathematics in Secondary Schools in Kakamega County, Kenya	
3.20-4.00PM	PLENARY SESSION	Dr. Tony Okwach

SUB THEME: EDUCATION FOR 21ST CENTURY AND BEYOND
DAY 2: WEDNESDAY, 14TH JULY 2021 VENUE: SUB THEME VIRTUAL PLATFORM

11.00-11.20AM	Polycarp Muchesia Ishenyi (Bomet University College, Kenya). Effects of Teachers' Level of Knowledge in Instructional Technology on Students' Achievement in Mathematics in Secondary Schools in Kakamega County, Kenya	Dr. John Momanyi
11.20-11.40AM	Jane Opiri (University of Arkansas Pine Bluff, US), Dr. Joseph Otundo (University of Arkansas Little Rock, US) and Dr. Andrew Andayi (Murang'a Technical University, Kenya). Can Internationalization of Higher Education Be Sustainable?	
11.40-12.00PM	Tony Okwach Omusonga, Bomet University College, Kenya. Assessment of Skills of 21 st Century Teaching Profession in Bachelor of Education Programs in Kenya: A Case Study of Bomet University College	
12.00-12.20PM	Wayong'o John Wanjala (Bomet University College, Kenya). Internationalization of Higher Education through Quality Assurance	
12.20-12.40PM	John M. Momanyi, Salome Lulley (Bomet University College, Kenya), Joseline Metobo (Kenya Institute of Management). The Effective use of Information Communication Technology in Higher Education: Reflections on Curriculum and the Work Place	

12.40-1.20PM	PLENARY SESSION	Dr. Richard Sigilai
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SUB THEME: SCIENCE AND TECHNOLOGY, AGRICULTURE, ENVIRONMENT AND NATURAL RESOURCES

DAY 1: TUESDAY, 13TH JULY 2021 VENUE: SUB THEME VIRTUAL PLATFORM

TIME	PRESENTATION	RESPONSIBILITY
2.00-2.20PM	Eliud N. Wafula¹, Sylvia I. Murunga², Joseph Sang³ and Josiah Kuja⁴ (¹Bomet University College, Kenya, ^{2,3,4}Jomo Kenyatta University of Agriculture and Technology, Kenya). Prokaryotic Diversity in the Sediments of Lake Ol'Bolessat as Source of Biofertilizer for Sustainable Agriculture in Kenya	Dr. Elizabeth Chirchir
2.20-2.40PM	E. K. Amadi (Bomet University College, Kenya). Assessment of Heavy Metals and Nutrients Loads in Water Soil and Sediments Samples along Sosiani River, Kenya.	
2.40-3.00PM	Godfrey O. Mauti¹, Justus M. Onguso² (¹Bomet University College, Kenya, ²JKUAT, Kenya). Crude petroleum-oil Biodegradation Efficiency of <i>Bacillus subtilis</i> and <i>Pseudomonasaeruginosa</i> Strains Isolated from a Petroleum-oil Contaminated Soil from Ngara East in Nairobi, Kenya	
3.00-3.20PM	David Kimutai Melly (Bomet University College, Kenya). Conservation priorities and distribution patterns of vascular plant species In North and South Nandi Forests	
3.20-4.00PM	PLENARY SESSIONS	

SUB THEME: SCIENCE AND TECHNOLOGY, AGRICULTURE, ENVIRONMENT AND NATURAL RESOURCES

DAY 2: WEDNESDAY, 14TH JULY 2021 VENUE: SUB THEME VIRTUAL PLATFORM

11.00-11.20PM	*Kibe H.E.¹, Sakwa T.W.², Khanna K.M.³ (¹Bomet University College, Kenya, ²Masinde Muliro University of Science and Technology, Kenya, ³University of Eldoret, Kenya). Integrated S-Wave and P-Wave Pairing States in Heavy-Fermion Superconductors.	Dr. Adolphus Wagala
11.20-11.40PM	Conrad Khisa Wanyama¹, Fred Wekesa Masinde², John Wanjala Makokha³ and Michael Waswa (^{1,3&4}Kibabii University, ²Kabianga University). Measurement of Radioactivity Levels in Tailings at Rosterman Gold Mine, Western, Kenya.	

11.40-12.00PM	¹*Kiprono Maritim Simeon and ²Rotich Kimutai John (¹Bomet University College and ²University of Kabianga). Comparison of 2-Level and 3-Level Crank-Nicholson Based Methods on the Solution Of 1-D Heat Equation	
12.00-12.20PM	Chisira Samwel Namayi. The Study of Internal Energy, Specific Heat and Entropy of A Micro canonical Ensemble of A Mixture of Helium-3 And Helium-4 With Duo-Fermion Spin Degeneracy.	
12.20-1.00PM	PLENARY SESSION	Dr. Kwembur
LUNCH BREAK		
2.00-2.20PM	Dinah Ayoma Wechuli (Bomet University, Kenya). Pollution Risk Assessment of Groundwater at Kamkuywa Market Center, Bungoma Using Geospatial Technology	Dr. Everlyne Amadi
2.20-2.40PM	*Muyoma,Wanjala Paul¹, Odokuma Lucky², Ibisime Etela³, Rose Ramkat⁴, Wabusya Moses⁵(1Centre of Excellence in Oil Field Chemicals Research [ACE-CEFOR]/Department of Microbiology, University of Port Harcourt, Nigeria& Department of Physical and Biological Sciences, Bomet University College, Kenya:²Department of Microbiology, University of Port Harcourt, Nigeria;³Department of Animal Science, University of Port Harcourt, Nigeria;⁴Center of Excellence in Phytochemicals, Textiles and Renewable Energy, Moi University, Eldoret, Kenya;⁵Department of Biological Sciences, Moi University, Kenya). Seasonal Population Trends of Microbial Communities in Oil Tainted Soils in Greater Port Harcourt Area, Nigeria	
2.40-3.00PM	Godfrey Omare Mauti¹*, Eliakim Mbaka Mauti², David Keno Kowanga³ (¹Bomet University College, ²Kenyatta University, ³Maseno University). Anticancer Activity of Eugenia JambolanaSeedonHuman Epithelial Type 2 (HEp-2) Cells	
3.00-3.20PM	¹Owili, P. A, ²Opondo, F.A (Laikipia University, Kenya). Time Series Intervention Modelling for Analyzing and Forecasting Beans and Potato Yield in Kenya	
3.20-4.00PM	PLENARY SESSION	Dr. Eliud Wafula

SUB THEME: THE NEXT BUSINESS FRONTIER**DAY 1: TUESDAY, 13TH JULY 2021 VENUE: SUB THEME VIRTUAL PLATFORM A**

TIME	PRESENTATION	RESPONSIBILITY
2.00-2.20PM	¹Okode M O & ²Obura J M (¹Maseno University, Kenya, ²Bomet University College, Kenya). Moderating Effect of Financial Inclusion on the Relationship Between Digital Financial Services and Financial Performance of Commercial Banks in Kisumu County, Kenya	Dr. Richard Rotich
2.20-2.40PM	¹Wafula Olanga and ²Catherine Njoki Kamwocere (¹Bomet University College, Kenya, ²KCA University, Kenya. Credit Management and Accounts Receivables in Private Hospitals in Kenya	
2.40-3.00PM	Nelly Chelangat Mutai (Bomet University College). Effect Of Corporate Governance on Return on Assets of Listed Companies in Nairobi Securities Exchange.	
3.00-3.20PM	Mary Andika, Mike Iravo & Noor Ismael (JKUAT, Kenya). Influence of Competitive Tendering on the Performance of Devolved System of Governments in Kenya	
3.20-4.00PM	PLENARY SESSION	Dr. Philip Bii

SUB THEME: THE NEXT BUSINESS FRONTIER**DAY 2: WEDNESDAY, 14TH JULY 2021 VENUE: SUB THEME VIRTUAL PLATFORM**

TIME	PRESENTATION	RESPONSIBILITY
11.00-11.20AM	Patrick B. Ojera (Bomet University College). Greening the General Ledger: Environmental Management Accounting in Bomet University College, Kenya.	Dr. Clement Nkaabu
11.20-11.40AM	Henry Kiplangat Cheruiyot (Bomet University College). Effect of Green Innovation Practices on Environmental Performance of Manufacturing Firms in Kericho County	
11.40-12.00PM	Geoffrey Kiprono Biwott & Leah Jemutai Barno (Bomet University College, Kenya). Green Entrepreneurship as a Panacea for Financial Sustainability of Businesses in Kenya Today.	
12.00-12.20PM	Stephen Wekesa Masinde and Dr. Josephine Ojiambo Wanyama (Masinde Muliro University of Science and Technology). Government Involvement in support of green Entrepreneurs in Kenya.	
12.20-1.00PM	PLENARY SESSION	Dr. Sangura Ramari
1.00-2.00PM	LUNCH BREAK	

2.00-2.20PM	James Mwikya Reuben (Kirinyaga University) and Johnmark Obura (Bomet University College). Security Threats, Mitigation and Framework for Cloud Computing Applications: A Theoretical review.	Dr. Philip Bii
2.20-2.40PM	Felister Abulwa Mutoka¹, Dr Susan Were², Kepha Ombui³ (JKUAT, Kenya). Decentralization of Human Resource Management Practices and Employee Performance in Constitutional Commissions in Kenya	
2.40-3.00PM	Chumo Sylvia Chepkosgey (JKUAT, Kenya). Performance Appraisal Practice Opportunity and Employee Retention in Selected Beverage Processing Firms in Kenya	
3.00-3.20PM	Everlyne Chebukati Bukhuni (JKUAT, Kenya). The Effect of Motivation Practices on Employee Performance in Public Secondary Schools in Kenya	
3.20-4.00PM	PLENARY SESSION	Dr. Wafula

SUB THEME: SUSTAINABLE GOVERNANCE AND STEWARDSHIPDAY 1: TUESDAY, 13TH JULY 2021 VENUE: SUB THEME VIRTUAL PLATFORM

TIME	AUTHOR/TITLE OF PAPER	RESPONSIBILITY
2.00-2.20PM	Sally Burer & Leonard Koech (Bomet University College, Kenya). Influence of Traditional and Cultural Institutions on Environmental Conservation in Kenya, The Case of Moiben, Uasin Gishu Cuntly.	Dr.Mohamed Mraja
2.20-2.40PM	Kenneth Uki¹, Catherine Buteyo²& Tabitha Sewe³ (¹ Bomet University College, Kenya, ² Moi University, Kenya & ³ Maasai Mara University, Kenya). Religious Liberty Consciousness among Siaya-Kisumu Seventh-Day Adventist Members	
2.40-3.00PM	PLENARY SESSION	Dr. Suleiman Chembea

SUB THEME: THE NEXT BUSINESS FRONTIERDAY 1: TUESDAY, 13TH JULY 2021 VENUE: SUB THEME VIRTUAL PLATFORM **B**

3.10-3.30PM	Amos K Chepsergon and Nkaabu Clement (Bomet University College, Kenya). Diversity in Gender and Diversity in Age among Workers on Employee Performance in Selected Universities in Kenya.	Dr. Sangura Ramari
3.30-3.50PM	Leah Jemutai Barno & Job Ilanyi (Bomet University College, Kenya). Green Finance Strategic and Sustainable Development: An Empirical Study.	
3.50- 4.10PM	John Karori Nyamiobo (Jomo Kenyatta University of Agriculture and Technology, Kenya). Effect of Asset Tangibility on Financial Performance of Firms Listed at the Nairobi Securities Exchange, Kenya	
4.10-4.40PM	PLENARY SESSION	Prof. Patrick Ojera

END OF CONFERENCE

SUB THEME: EDUCATION FOR 21ST CENTURY AND BEYOND

Relationship between Tutor Confidence and ICT Integration in Primary Teacher Training Colleges in Kenya

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ABSTRACT

Despite increases in computer access and technology training, ICT is not being used to support instruction in teacher education institutions. It is common knowledge that the self-confidence of teachers affects their use of technology in instruction. The study assessed primary teacher training college tutors' confidence regarding the use of ICT in the teaching and learning practice in Kenya, which is a developing country. There are a number of ICT projects that are equipping Kenyan institutions of learning with computers and establishing internet connectivity. But the body of literature on studies among tutors is so scanty, leaving a noticeable gap in the literature about tutors' level of ICT integration into instruction. The study sought to establish the relationship between tutor confidence and their level of ICT integration primary teacher training colleges in Kenya. A cross sectional survey was conducted to investigate tutors' confidence with the use ICT in teaching. The simple random sampling technique was used to select six teacher training colleges in Kenya and 169 respondents who participated in the study. Data was collected using a questionnaire and an interview schedule. The data collected was analyzed descriptively for frequencies, means, standard deviation and percentages. The significance of relationships and differences of variables were tested using Pearson moment Correlation and Regression analysis. Results indicated that there is a low level of ICT integration in teaching in all teacher training colleges. A significant relationship was found between the tutor confidence and their level of ICT integration in teaching ($\beta_3 = 0.535, p < 0.05$). It was thus recommended that: College tutors should be given adequate exposure for them to be able to utilize ICT facilities in their classrooms. Colleges should also computerize most activities by buying computerized software within departments. This will compel most tutors to acquire the requisite skills. The ministry of education should embrace ICT and demand professional documents from college tutors be typed and sent online.

Keywords: Confidence, ICT, Integration, Teaching, Teacher Training colleges, Kenya, Tutors.

Integrated Principal Leadership on School Climate for Pedagogical Quality among Selected Public Secondary Schools in Nakuru County, Kenya

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Abstract

This paper, premised on the findings of a study, seeks to determine the influence of integrated leadership, namely instructional and transformational leadership, on school climate in selected public secondary schools in Nakuru County, Kenya. A quantitative research design was adopted for the study. Purposive sampling technique was used to select the respondents from the area of study whose schools had presented their students for KCSE examinations. The population comprised the principals, deputy principals and five (5) academic HODs from each of the 39 secondary schools. Therefore, a total of 273 respondents comprising 39 principals, 39 deputy principals and 195 HODs constituted the sample size for the study. A four-point Likert scale was used to measure the perceptions of the respondents on the prevailing school climate, while a five-point Likert scale continuum for both instructional and transformational leadership was adopted. Data was collected using validated PIMRS on instructional leadership; MLQ-5X questionnaires on transformational leadership and OCDQ-RS instruments was used on school climate. Data was analyzed using descriptive and inferential statistics with the aid of Statistical Package for Social Sciences (SPSS) computer program for Microsoft Windows®. All statistical tools were subjected to tests of significance at $\alpha = 0.005$. The paper shows that principal's leadership in public secondary schools is associated with creating and sustaining a positive climate as a result of a positive relationship between the principal and the teachers. The author recommends that the Ministry of Education, among other stakeholders, should organize extensive in-service development programs and further encourage school principals to enroll for short courses in educational leadership with specific emphasis on the importance of integrating instructional and transformational leadership in order to create and sustain a positive school climate to realize pedagogical quality.

Keywords: Integrated Leadership, Instructional Leadership, Transformational Leadership, School Climate, Public Secondary Schools, Pedagogical Quality

Students' Opinion on School Rules and Regulations as A Governing Tool: A Case Study Of A Peri-Urban Mixed Secondary School In North-Rift Kenya

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Abstract

The purpose of the study was to investigate students' opinion on school rules with regard to students' council-student relationship. The theoretical framework adopted was informed by Etzioni's (1961) Compliance Theory. The study engaged qualitative design and case study methodology. Unstructured interviews were used in data collection followed by data transcription. Trustworthiness of the study was achieved through "the member check" to check validity while reliability was enhanced through cross checking the transcripts for obvious mistakes. Piloting was carried out with form 4 students in a peri-urban mixed secondary school in South-Rift, Kenya. Ethical considerations were observed throughout the study. Philosophical orientation was relativist ontology and constructivist epistemology. Data were analyzed thematically and the results presented as reported by the participants with the aid of thematic networks. According to the findings of the study, the global theme that emerged was that school rules and regulations were incongruent. Organizing themes were: school rules and regulations encouraged partisanship, inequality, the way they were administered were unappealing and that they encouraged intimate relationships. From the results, the study concluded that the students' council ought to have applied school rules and regulations fairly. The study recommended that the deputy principals ought to ensure that the students' council administer school rules in a non-partisan way, with equality to all, administration be appealing to all, and not be used to attract intimate relationships.

Keywords: School, Students' council, Students, opinion, Rules, Regulations

Effects of Teachers' Level of Knowledge in Instructional Technology on Students' Achievement in Mathematics in Secondary Schools in Kakamega County, Kenya

Dr. Polycarp Muchesia Ishenyi
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Bomet University College, Kenya

Abstract

Teachers need to employ knowledge in instructional technology in the classroom to improve learners' achievement in Mathematics. This study examined the effects of teachers' level of knowledge in instructional technology in Mathematics on students' achievement in the subject. The study was guided by the TPACK theory, and was implemented using mixed methods approach. The target population was 801 teachers of Mathematics in public secondary schools. A sample of 80 teachers was selected by multistage sampling procedures. Research instruments included; questionnaire, interview schedule, observation checklist, and document analysis guide. Data collected were analysed using frequency counts, means, percentages, and Pearson's correlation. Results revealed that there was a strong positive relationship between teachers' level of knowledge in instructional technology and student achievement in Mathematics i.e. teachers' technology knowledge affects students' performance. These findings will provide information that may be used to improve policies on Mathematics education.

Key Words: *Knowledge, Instructional Technology, Mathematics, Students' Achievement*

Mathematics Teachers' Content knowledge and Discourse: Effects on Students' Achievement in Mathematics in Secondary Schools in Kakamega County, Kenya
Polycarp Muchesia Ishenyi
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Abstract

The paper reports findings of a study that sought to assess the effects of Mathematics teachers' content knowledge and discourse on achievement in Mathematics among secondary school students in Kakamega County, Kenya. Specific objective was to investigate the relationship between Mathematics teachers' level of knowledge in Mathematics content used in Mathematics instruction and students' achievement in Mathematics. The study was guided by the TPACK theory, and was implemented using descriptive survey research design, via mixed methods approach. Multi-stage sampling was done to sample 80 Mathematics teachers from 801 teachers in public secondary schools in Kakamega County. The researcher used questionnaire, interview schedule, and document analysis guide. Data collected were analyzed using descriptive and inferential statistics. Results revealed no significant relationship between Mathematics teachers' content knowledge and student achievement in Mathematics. These findings will provide useful facts and figures that may be used to formulate better policies on Mathematics education.

Can Internationalization of Higher Education Be Sustainable?

Dr. Jane Opiri, University of Arkansas Pine Bluff, US; Dr. Joseph Otundo, University of Arkansas Little Rock, US; Dr. Andrew Andayi, Murang'a Technical University, Kenya

Abstract

Over the decades, international activities of universities have expanded in volume, scope and complexity, with activities ranging from study abroad, where students learn about other cultures, to extension and provision of higher education in countries that have high demand for education but less accessibility. The desire to use internationalization programs as the key to solve social, cultural, political and economic problems has led to expansion of higher education internationalization. UNESCO (2006) defines internationalization of higher education as “higher education that takes place in situations where the teacher, student, program, institution or provider and course materials become cross-national. This cross-border education may include higher education by public, private, not-for-profit and for-profit providers. It may encompass a wide range of modalities in a continuum from in person (students traveling abroad and having campuses abroad) to distance learning (using technologies and including e-learning)”. The need for diversification, collaboration and networking, strengthening of academic programs and the desire to achieve efficiency and productivity are some of the reasons that have spurred the rise in internationalization of higher education. This has resulted in growth in international research funding patents publications. Several countries are designing different policies to internationalize higher education and to attract as many international students as possible. In the past century, the emphasis was more on scholarship for foreign students' international development projects. Today with a rising population, demand for high quality education and an increase in the number of universities registered by governments, universities need to strategize in order to compete effectively in this saturated environment. These higher education institutions must at the same time meet the United Nations sustainable development goals. The UNESCO's Education 2030 Agenda recognizes that higher education is a key driver of the attainment of Sustainable Development Goal (SDG) 4, and thus higher education must “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”. This agenda argues that countries must invest and support lifelong equitable flexible learning pathways to all students. Thus, countries can invest in higher education by identifying priority areas and developing action steps towards internationalization of higher education at regional, system and international levels. Therefore, the purpose of this research paper is to understand the viability of internationalization of higher education. It will discuss the need, the process, the models and the benefits of internationalization of higher education. Models that local universities can use to initiate or engage in and expand in a sustainable internationalization higher education process will be discussed. Case studies will be identified to see how different countries have created sustainable higher education internationalization. The analysis of this paper will create a basis for which higher education institutions can argue for or against the sustainability of internationalization of higher education.

Key words: internationalization, higher education, sustainability

ASSESSMENT OF SKILLS OF 21ST CENTURY TEACHING PROFESSION IN BACHELOR OF EDUCATION PROGRAMS IN KENYA: A CASE STUDY OF BOMET UNIVERSITY COLLEGE

Dr. Tony Okwach Omusonga, Bomet University College, Kenya

Abstract

Education systems globally are changing to rethink the teaching-learning process in order to prepare better individuals to be able to meet the changing social and economic demands. It is against this backdrop that in

2019 Kenya adopted the Competency Based Curriculum (CBC) in an effort to reform her education system and make it globally competitive with regard to human resource development. However, universities in Kenya are yet to restructure their teacher education programs to align them to the demands of 21st Century teaching profession. This study sought to assess extent to which skills of the 21st century teaching profession were accorded emphasis in the initial teacher education programs in universities in Kenya. The study adopted descriptive survey and case study research designs. The study population comprised 51 Teaching Practice Assessment Criteria (TPAC). Purposive sampling technique was used to select Bomet University College (a Constituent College of Moi University) which formed the unit of study and saturated sampling technique was then used to select 1 TPAC which was studied to ascertain how well the various Bachelor of Education programs equipped teacher trainees with skills of the 21st century teaching profession. Document analysis guide was used to collect data. Quantitative data was analyzed using mean scores. The results yielded an overall average emphasis ($M = 2.95$) of the skills of the 21st century teaching profession in the Bachelor of Education program. The study concluded that the Bachelor of Education program in Kenya produced graduates who were ill-equipped with skills of 21st century teaching profession. The graduates lacked digital literacy and innovation and entrepreneurship skills and were insensitive to individual differences. The study will be useful to Deans of Schools of Education in universities in Kenya in their endeavor to restructure their teacher education programs to align them to the CBC.

INTERNATIONALIZATION OF HIGHER EDUCATION THROUGH QUALITY ASSURANCE

Author: Wayong'o John Wanjala
Institution: Bomet University College

Abstract

The demand for higher education remains a global agenda as different nations strive towards social, economic and political development. As a result, *internationalization*, both as an idea and an agenda has gained momentum in institutions of higher learning around the world. For internationalization of higher education to succeed, there is need for well structured approaches. One such approach is Quality Assurance Culture. The purpose of this article is to provide institutions that offer higher education with insights on how to achieve internalization of higher education through a Quality Assurance Culture approach. This approach looks at quality assurance culture based goals, strategies, and processes of internationalization. The author presents an examination of internationalization processes currently underway in many institutions of higher learning around the world. He discusses a Quality Assurance Culture approach that should be embraced at all divisions, schools, sections, faculties and units while elucidating barriers to internationalization, and improving structures, processes, mechanisms and actions to enhance internationalization. An in-depth critical analysis of the approach leads to recommendations and a framework for navigating diverse roles and responsibilities of stakeholders in internationalization of higher education through an institutional quality assurance culture.

THE EFFECTIVE USE OF INFORMATION COMMUNICATION TECHNOLOGY IN HIGHER EDUCATION: REFLECTIONS ON CURRICULUM AND THE WORK PLACE

by

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ABSTRACT

The work environment has remained steadily dynamic just as our education systems. This has been necessitated by the equally changing societal and industry needs. In the face of all these changes, one phenomenon that has not been appropriately embraced both at work and education is Information Communication and Technology (ICT). This is as a result of the misconception that technological skills can be acquired in isolation from the core curriculum subjects and that technology is for the science disciplines as opposed to non-science ones. Technological skills, especially in regard to the role of ICT at the work place, are very crucial in determining the efficiency and effectiveness of staff in the information age. The teaching of computer packages, or computer studies or Information Technology or ICT in isolation limits the learners' ability to fully harness the potential of ICT real life situations. Thus, the discussants in this paper argue that ICT should be integrated in all the core curriculum subjects especially in higher education to help students not only to internalise ICT knowledge and skills but also practically apply them in learning environments as they figure out their applications at the work place before employment. The teaching of computer packages, or computer studies or Information Technology or ICT in isolation is deficient in a way as most students have to be re-oriented in the use of ICT's once employed or in industry. It is worse for those who never had a chance to acquire these skills and knowledge during their college/university education because they have to learn them afresh. Even after this, linking these knowledge and skills to the work demands is at times a challenge to many. This paper identifies some of these skills and proposes how they can be integrated in initial professional training with a view of making their applicability at work place realistic and rewarding.

Key terms: ICT, work skills, higher education, core curriculum, integration, learning environments.

**SUB THEME: SCIENCE AND TECHNOLOGY, AGRICULTURE, ENVIRONMENT AND
NATURAL RESOURCES**

Prokaryotic Diversity in the Sediments of Lake Ol' Bolossat as Source of Biofertilizer for Sustainable Agriculture in Kenya

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³**Department of Soil, Water and Environmental Engineering, Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya.**

⁴**Department of Botany, Jomo Kenyatta University of Agriculture and Technology, Nairobi Kenya.**

Abstract

Kenyan lakes can offer a sustainable way for agriculture and food security. The population increase, climate change, and increased demands for plant and animal products necessitate novel ideas and technologies of using bacteria and archaea to mitigate the adverse effects of excessive use of inorganic fertilizers and to maximize the potential of the land. The sediment from freshwater lakes is a promising biological deposit with huge potential in agricultural crop production as a soil conditioner and biofertilizer. This study aimed at determining prokaryotic diversities using culture-dependent and culture-independent methods. Pikovskaya's agar medium and Norris Glucose Nitrogen free medium were used to target Phosphate solubilising and nitrogen-fixing bacteria respectively, the 16S rRNA gene of the isolates was amplified with 27F and 1492R bacterial universal primers. Metagenomic analysis was done on DNA extracted directly from sediments and water samples. The gene-specific primers (515F and 806R) were used to amplify the V3-V4 variable regions of the 16S rRNA gene under Illumina high throughput sequencing. A total of 50 bacteria were isolated and identified from Lake Ol' Bolossat. Based on 16S rRNA gene analyses, the identified isolates were clustered under the genera *Bacillus*, *Arthrobacter*, *Pseudomonas*, *Paenibacillus*, *Fictibacillus*, and *Acinetobacter*. Consequently, the metagenomic analysis of the 16S rRNA genes from Lake Ol' Bolossat revealed that prokaryotic communities were dominated by archaea (92.86%) and bacterial (7.14%) communities. The most predominant archaeal genera included: *Candidatus_Methanoperedens* and *Methanosaeta* (21.40%), *Rice_Cluster_I* (8.6%), *Methanosarcina*, and *Methanocella* each (7.1%), *Methanobacterium* (5.70%), *Methanoregula* (2.8%), *Methanolinea*, *Candidatus_Nitrososphaera*, and *Candidatus_Nitrocosmicusea* each (1.4%). Bacteria genera included *Desulfobacca* and *Paraherbaspirillum* each 1.4%. Less abundant (< 0.002) archaea and bacteria occupied 17.1%. The study demonstrated that Lake Ol' Bolossat harbours diverse bacteria species that are resilient for the promotion of plant growth. Dominant methanogens in lake Ol' Bolossat can be used as a potential source of bioenergy thus reducing carbon emission as well as pollution management.

Keywords: Sediment, metagenome, biofertilizer, 16S rRNA gene, bacteria

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Assessment of Heavy Metals and Nutrients Loads in Water Soil and Sediments Samples along Sosiani River, Kenya.

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Abstract

Pollution loads from heavy metals, nitrates and phosphates along river Sosiani was investigated. The aim of this study was to investigate the extent of pollution in river Sosiani and to obtain data on the nature and level of contaminations of heavy metals, micro pollutants and nutrients. Three samples of soil, sediments and

water were collected from five sites, analyzed for the presence of selected parameters. Nitrates in the water were determined using ultra violet spectrophotometric screening method and in soil and sediment by colorimetric method. The phosphates content in water was determined using ascorbic acid method while in soil and sediment Olsen method was used. The chemical oxygen demand was determined using titrimetric method. In the results nitrate values ranged between 0.0002 ± 0.0001 and 0.1501 ± 0.0025 ppm, which was below EMC recommended value of 3.0 ppm. Sediments had highest phosphate values during wet season ranging between 1.824 ± 0.320 and 1.564 ± 0.000 ppm which were below the Kenya Bureau of Standards recommended value 10.0 ppm. The COD ranged between 22.42 ± 2.84 mg/L and 45.12 ± 3.24 mg/L, and was below KEBS recommended value of 50.0 ppm. Heavy metals were analyzed using wet digestion method and values obtained were above the set limits. At site 3 values obtained for Iron (3.562 ± 0.012 , 3.033 ± 0.131 , 0.033 ± 0.013 ppm), Lead (4.891 ± 0.030 , 1.39 ± 0.030 , 1.89 ± 0.000 ppm), Cadmium (0.065 ± 0.003 , 0.103 ± 0.002 , 0.013 ± 0.002 ppm), Zinc (2.372 ± 0.031 , 0.410 ± 0.003 , 0.310 ± 0.033 ppm) and Copper (0.728 ± 0.000 , 0.113 ± 0.000 , 0.213 ± 0.000 ppm) for soil, sediment and water, respectively. Concentrations exceeded KEBS permitted levels of 0.005 ppm for Iron, 0.005 ppm for Lead, 0.01 ppm for Cadmium and 0.005 ppm for Copper. Zinc values were above the WHO standards recommended for drinking water of 0.50 ppm. This confirmed the deterioration of the water. For the parameters studied it can be concluded that the river Sosiani water (downstream) is not safe for domestic use.

Key words: Contamination, Zinc, Lead, Cadmium, Copper.

Crude petroleum-oil biodegradation efficiency of *Bacillus subtilis* and *Pseudomonasaeruginosa* strains isolated from a petroleum-oil contaminated soil from Ngara East at Nairobi, Kenya

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The efficiency of *Bacillus subtilis* DM-04 and *Pseudomonasaeruginosa* M and NM strains isolated from a petroleum contaminated soil sample from Ngara East garage at Nairobi was compared for the biodegradation of crude petroleum-oil hydrocarbons in soil and shake flask study. These bacterial strains could utilize crude petroleum-oil hydrocarbons as sole source of carbon and energy. Bioaugmentation of TPH contaminated microorganism with *P.aeruginosa* M and NM consortia and *B.subtilis* strain showed a significant reduction of TPH levels in treated soil as compared to control soil at the end of experiment (120d). *P.aeruginosa* strains were more efficient than *B.subtilis* strain in reducing the TPH content from the medium. The plate count technique indicated expressive growth and biosurfactant production by exogenous lyseeded bacteria in crude petroleum-oil rich soil. The results showed that *B.subtilis* DM-04 and *P.aeruginosa* M and NM strains could be effective for in situ bioremediation.

Keywords: *Bacillus subtilis*; Biodegradation; Bioremediation; Biosurfactant; Polyaromatic hydrocarbon (PAH); *Pseudomonasaeruginosa*; Total petroleum hydrocarbon (TPH)

Conservation priorities and distribution patterns of vascular plant species In North and South Nandi Forests

David Kimutai Melly

Bomet University College, School of Pure and Applied Sciences

Abstract

Distribution patterns of biodiversity and the factors influencing them are important in conservation and management strategies of natural resources. With impending threats from increased human population and global climatic changes, there is an urgent need for a comprehensive understanding of these patterns, more so in species-rich tropical montane ecosystems where little is known about plant diversity and distribution. We compiled a checklist of the flora of South and North Nandi forests based on literature, online databases, herbarium collections and floristic field surveys. A combination of general walk-over surveys and plotless landscape sampling for plant collection and sight observation was used. We recorded 628 plant species representing 118 families and 392 genera, which almost double the latest results of the previous most recent survey. We found 61 species of ferns and fern allies and 567 species of seed plants, representing 9.98% of the total plant species in Kenya. Herbs were the majority (50.2%) of life forms followed by shrubs (16.5%). We report unique populations of three species out of 19 species that are widespread in Africa, but restricted to Nandi and Kakamega Forests in Kenya. Four of the recorded species are threatened globally and 16 exotic plant species were found. The recent description of one new species and two new records for Kenya from these forests, together with the comprehensive checklist is of crucial importance to the conservation of these unique ecosystems. Our results are essential to forest managers, community forest associations, conservationists, students and research scientists in Kenya and globally for implementing critical decisions for the conservation of this vital biodiversity resource.

Keywords: Biodiversity, conservation, floristic survey, inventory, Nandi County

INTEGRATED S-WAVE AND P-WAVE PAIRING STATES IN HEAVY-FERMION SUPERCONDUCTORS.

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ABSTRACT

A new theory that could explain how unconventional superconductivity arises in a diverse set of compounds needs to be developed.

In a study published last month in *npj Quantum Materials*, Si of Rice University and Nica of Arizona State University argue that unconventional superconductivity in some heavy-fermion materials arises from a general phenomenon called “multiorbital singlet pairing.”

In superconductors, electrons form pairs and flow without resistance. Physicists cannot fully explain how pairs form in unconventional superconductors, where quantum forces give rise to strange behavior. Heavy fermions, another quantum material, feature electrons that appear to be thousands of times more massive than ordinary electrons.

In this model we consider a pair of electrons that dance with each other and characterize that dance by integrated s- wave and p-wave channels that fuse together into one. The model constructs mathematical wave functions that describe quantum states.

This can help advance a more complete description of pairing states in heavy-fermion superconductors.

Heavy fermion, materials are examples of strongly correlated electron systems that exhibit diverse quantum ground states such as antiferromagnetic order, ferromagnetic order, non-Fermi-liquid phases, unconventional superconductivity, quantum spin liquids, orbital order and topological order. In contrast to other strongly correlated electron systems, heavy fermion systems have relatively small characteristic energy scales. Heavy fermion materials thus serve as ideal systems for studying quantum phase transitions, superconductivity and their interplay. HF comprise a strongly interacting system of particles posing a problem finding the energy, or other properties of the system in the ground state. In this review, the properties of Uranium and Cerium based heavy fermion systems are summarized, and some frontier scientific issues in this field are discussed, in particular, concerning heavy fermion superconductors’ quantum phase transitions.

**Measurement of Radioactivity Levels In Tailings At Rosterman Gold Mine, Western, Kenya.
Conrad Khisa Wanyama¹, Fred Wekesa Masinde², John Wanjala Makokha³ and Michael Waswa
(^{1,3&4}Kibabii University, ²Kabianga University)**

ABSTRACT

The studied gold mine is located in Lurambi sub-county, Kakamega County, Kenya. The mine has approximately 2,000 people who engage in daily small-scale artisanal gold mining activities. The gold mine tailings over the past have reported naturally occurring radioactive materials (NORM) which have posed adverse radiation risks to the immediate population though there is no proper documentation on the levels of radioactivity and associated hazardous impact on the Rosterman population. The study sampled thirty tailing samples from Rosterman gold mine tunnels, samples were then oven heated at a temperature of 105°C and then crushed by using mortar and pestle. Samples were then sieved and packed in 200 ml plastic bottles for 28 days to attain secular equilibrium. One at a time, the samples radioactivity measurements was done by using the NaI(TI) detector coupled to necessary electronics with pre-installed software at the physics laboratory in Kenyatta University. The overall average activity concentration for all the tailing samples was found to be 263 ± 13.19 Bqkg⁻¹, 123 ± 6.15 Bqkg⁻¹ and 84 ± 4.23 Bqkg⁻¹ for ⁴⁰K, ²³²Th and ²³⁸U respectively. All tailing samples analyzed gave out activity concentration below the world average values, hence poses insignificant health risk implication to general public. The calculated internal hazard index was 0.7 ± 0.03 while external hazard index was 0.9 ± 0.04 both below a unit for a material to be termed unsafe to interact with in radiological context. The average value of radium equivalent was 278 ± 13.04 Bqkg⁻¹ which is below the permissible level of 370 Bqkg⁻¹ hence mining of gold at Rosterman poses insignificant radiological risks to the miners and the residents around.

COMPARISON OF 2-LEVEL AND 3-LEVEL CRANK-NICHOLSON BASED METHODS ON THE SOLUTION OF 1-D HEAT EQUATION

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ABSTRACT

We develop a 3-level implicit finite difference scheme similar to the ordinary Crank-Nicholson (CN) method. We call this method modified Crank-Nicholson Du-Fort and Frankel (MCN-DF) method. We compare theoretical solution from the ordinary CN and (MCN-DF) of 1-D heat equation. We determined that the (MCN-DF) method produces more accurate solution compared to CN.

The Study of Internal Energy, Specific Heat and Entropy of A Micro canonical Ensemble of A Mixture of Helium-3 And Helium-4 With Duo-Fermion Spin Degeneracy
Chisira Samwel Namayi

Abstract

A system of a mixture of Helium-3 and Helium-4 was considered in a weakly interacting system in this study. The thermodynamic properties of a microcanonical ensemble have been under extensive study taking into consideration the two unique isotopes helium (Helium-3 and Helium-4). In most of the studies on the thermodynamic properties of the microcanonical ensemble, the spin which is an essential aspect in studying the two ultra-cold atoms has been considered. The double spin in Helium isotopes turns out to be the most essential aspect in the determination of character and rate of collision of ultra-cold atoms. The concept of duo-fermion spin has remained elusive in determining the properties of Helium isotopes. This study aimed at determining the temperature dependent characteristics of Helium-3 and Helium-4 isotopes with a duo fermion spin degeneracy. This research aimed at determining the internal energy (U), specific heat (C_v) and entropy (S) from the partition function (Z). The partition function of an isolated system was developed to aid in the studying of the thermodynamic properties of the system. The computer software MathCAD was used in generation of data from the derived equations. The internal energy (U) and entropy (S) at low temperatures of $T < 15$ were zero since at low temperature there are fewer states to be occupied by particles. In the temperature range of $15 < T < 60$ the internal energy (U) and entropy (S) were noted to be increasing logarithmically with increase in temperature since particles shifted to higher energy states where they possess higher energy. At temperatures $T > 60$ the internal energy (U) and entropy (S) were constant due to particle saturation. At low temperatures $T < 10$ the specific heat (C_v) was noted to be zero since the particles were still in their low energy state. The particles shift to higher energy states as temperatures increases hence the specific heat (C_v) is noted to be increasing exponentially to a peak value of $5.049 \times 10^{19} \text{ J/K}^2$ at 28 . The jump was also noticed in the specific heat (C_v) graph which implied that there is phase transition at temperature of about 28 .

Pollution Risk Assessment of Groundwater at Kamkuywa Market Center, Bungoma Using Geospatial Technology

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ABSTRACT

Pathogenic contamination of groundwater, due to poor sanitation, has continuously posed a significant health risk to human health. Kamkuywa market center, a peri-urban settlement, relies heavily on shallow wells for water supply and use of pit latrines as a mean of waste disposal, hence risking groundwater microbial contamination. This study used GIS-based risk mapping to establish the extent of groundwater pollution by coliforms and determine the relationship between selected risk factors, namely: depth to the water table, distance from a shallow well to the nearest pit latrine, pit latrine depth, soil permeability and ground slope for purposes of establishing the optimal well-pit latrine separation distances under different hydro-geological conditions. All shallow wells and pit latrines in the study area were mapped and the separation distances compared to the recommended standards. Water samples in 32 shallow wells were collected and analyzed for fecal content. The regression model was used to determine the relationship between coliform concentration and the selected risk factors as well as establish the extent of contamination and optimal distancing. The results indicate that 67.6% of shallow wells did not meet the World Health Organization and the Kenya safe distance criteria. In terms of relationship, pit latrine depth and soil permeability positively correlated with contamination. A negative relationship was established between groundwater contamination and water table depth and no relationship with surface slope. Out of 32 shallow wells sampled for fecal coliform analysis, 31 tested positive for fecal coliforms. The study concluded that portable water is scarce in Kamkuywa Market Center as a result of extensive groundwater contamination. Lastly, safe distances can vary from area to area depending on the climatic and hydro-geological conditions of an area.

Key Words: Kamkuywa, Groundwater, Pollution, Fecal Coliforms, Regression, Shallow Wells, Pit latrines

Seasonal population trends of microbial communities in oil tainted soils in Greater Port Harcourt Area, Nigeria

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Seasonal population trends of microbial communities in oil tainted soils in Greater Port Harcourt Area, Nigeria

Abstract

The utilization of oil in industries has devastating effect to the environment. Industrial effluents and oil spills are continuously contaminating the soil. Further seasonality influences the distribution of pollutants in soil. Consequently, soil microbial biota and ecological processes are affected. This study assessed the effect of seasonality on soil fungal and bacterial communities in oil contaminated soils in 12 selected sites in Greater Port Harcourt Area. Standard analytical procedures were used to obtain bio-physicochemical data from the soil samples and t test was used to analyse data. The levels of total petroleum hydrocarbons (TPH) were above 5000 ppm (DPR recommended limit). There was significant difference ($p \leq 0.000$) between the means of TPH in wet and dry seasons. Seasonality influenced % HUF and % HUB in the soils of urban, industrial and agricultural sites. Generally, the seasonality trends showed that there was a declining population of THB, HUB, TF, and HUF from the wet season to the dry season. However, the results show that there was a stable trend in % HUB as compared to oscillations observed in % HUF in oil tainted soils across a seasonal divide. We recommend characterization of the microorganism to identify the best candidate for bioremediation of oil tainted soils across a seasonal divide.

Key words: Soil, Fungi and Bacteria, Community Structure, Total Petroleum Hydrocarbons, Season

Anticancer Activity of *Eugenia jambolana* Seed on Human Epithelial Type 2 (HEp-2) Cells

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Background: In the 20th century, cancer has become a life-threatening disease leading to a high rate of mortality worldwide. Intensive investigations for finding new plant-based anticancer compounds are imperative and interesting. The seed of the *Eugenia jambolana* has been reported to contain phytochemicals like coumarin, flavonoids, glycosides, phenols, tannins and steroids. **Methods:** The active compounds from the seed of *E. jambolana* seed were extracted using the decoction extraction method using acetone, methanol and ethanol and the filtrate was obtained using a Whatman no.1 filter paper. The filtrates were dried reconstituted by re-dissolving in respective solvents. Different concentration of 8, 15.6, 31.25, 62.5, 125, 250, 500 and 1000 µg/ml. of the plant extracts were tested for the anticancer activity. The anticancer assay was performed on Human laryngeal epithelioma cells (Hep 2). The cell viability was measured using Methylthiazolyl diphenyl-tetrazolium bromide (MTT) assay.

Results: The results showed that *E. jambolana* ethyl acetate and methanol extracts possess anticancer activity on Hep2 cell line and anti-proliferative effect. Fifty percentage of cell death occurred in the methanol extract of 125 µg/ml dosage, as the highest cell death occurred at 1000 µg/ml of methanol extract.

Conclusion: This study showed the possibilities of better therapy for cancerous diseases from the seed of *E. jambolana*.

Keywords: Anticancer, *Eugenia jambolana*, Human laryngeal epithelioma cells (Hep2), Methylthiazolyl diphenyl-tetrazolium bromide (MTT) assay.

Time Series Intervention Modelling for Analyzing and Forecasting Beans and Potato Yield in Kenya

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Abstract

The agricultural sector in Kenya was devolved in 2013 with a view to improving the production and yield in the sector and thus ensuring food security. Since then, the effect of devolution on the performance of the agricultural sector is still unknown. This study sought to develop models for determining the effect of devolving the agricultural functions to counties for two food crops, beans and potato. Secondary time series annual data from 1961 to 2019 on area harvested, production and yield used in the study was obtained from FAO website. Data was analyzed using both descriptive and inferential statistics. A simpler and novel transformation of the data to achieve stationarity was employed. The study found that although the area of production of both crops have generally increased, the production level and the yield of beans and potato showed a downward trend and very high variability. The intervention period was 2013. The noise series model for potato yield was ARIMA (2, 0, 2) while for Beans ARIMA (4, 0, 9) was selected. These models were used to obtain the residuals for the period from 2014 to 2019 for the construction of the impulse response function. From the impulse function, it is evident that the yield of the two crops had a negative trend. The average change in yield after devolution was 37422hg/ha for potato and beans 206hg/ha. The study recommends that the county governments should train farmers to adopt good agricultural practices. The impact of uncertainty due to general elections should be mitigated.

Keywords: Noise model, Time series intervention, ARIMA, Impulse Response Function.

SUB-THEME: THE NEXT BUSINESS FRONTIER

Moderating Effect Of Financial Inclusion On The Relationship Between Digital Financial Services And Financial Performance Of Commercial Banks In Kisumu County, Kenya

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ABSTRACT

Kenya is characterized by a vibrant financial sector and high financial exclusion in most regions, Kisumu County included at 25.85%, compared to national average of 17.59%. This low Financial Inclusion (FI) could accelerate banks expansive use of Digital Financial Services (DFS) intended to enhance Bank Financial Performance (BFP). Contrary to this, Kenya finance sector performance, including Kisumu County, is on the decline hence, inconsistency with the postulates of Finance Innovation and Economic Value Added Theories, which holds “digital technology are intended to enhance firm’s liquidity” and “assess business performance based on the principle of value management” respectively. Past studies have not adequately addresses the nexus between DFS, FI and BFP. Scholars have focused on analysis of DFS or FI in establishing ‘determinants’ or ‘individual effects’ on BFP, and inconsistency results have been documented. This inconsistency could indicate an existence of a special relationship between the FI and DFS thus, a conceptualized moderation of FI on the relationship between DFS and BFP. The purpose of the study hence was to ascertain this moderating effect of FI. The study adopted correlational research design, a population of 172 managers at the 43 bank branches in Kisumu County, census survey and primary data. Regression results showed that DFS constructs explain BFP up to 76.2%; a unit increase in mobile financial services leads to .368 increase in BFP ($\beta=0.368$, $p<.05$) among other constructs. FI construct explains BFP up to 73.8%; a unit increase in need for sending and receiving funds leads to 0.645 increase in BFP ($\beta=0.645$, $p<.05$) among other constructs. FI is a significant component when dealing with both DFS and BFP ($\Delta R^2 = 0.054$, $p<.05$).

Key words: Digital financial services, Financial inclusion, Bank financial performance.

Credit Management and Accounts Receivables in Private Hospitals in Kenya

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ABSTRACT

Credit management in private hospitals in Kenya and basically in the whole world is a great challenge. The hospitals and the entire healthcare sector has a mandate to ensure citizenry wellbeing. Private hospitals service delivery has been compromised by poor credits management affecting accounts receivables and leading to operation inefficiency. The purpose of this study was to establish the effects of credit management on accounts receivables in private hospitals in Kenya. The population for this study was 50 private hospitals in Kenya that are fully accredited by the National hospital insurance fund scheme (NHIF) Category C and having bed capacity of more than 40 patients. Coefficient of determination (R^2) show that credit selection, credit terms, debt collection policy, credit standards explain 74.2% of the variations in the dependent variable, which is accounts receivables in private hospitals. The results also revealed that credit standards and accounts receivables of private hospitals have a negative and significant relationship ($\beta = -.215$, $p = 0.020$). Model results also revealed that credit terms and accounts receivables of private hospitals have a positive and significant relationship ($\beta = .245$, $p = 0.006$) The results also showed that debt collection policy and accounts receivables of private hospitals have a negative and significant relationship ($\beta = -.211$, $p = 0.039$). Credit selection has a negative and significant relationship with accounts receivables of private hospitals in Kenya ($\beta = -.237$, $p = 0.006 < 0.05$). The study concludes that credit standards, debt collection policy and credit selection negatively influences account receivables of in hospitals and credit terms negatively influences accounts receivables. Organization's credit terms specify the repayment that it places on all its credit customers. The study therefore recommends that private hospitals need to set some sets of credit standards to ensure that accounts receivables are minimized. The credit standards should be appropriate and achievable so as not to drive away prospective clients. A recommendation is further made that there is need to strike a correct balance (trade-off) between the total of opportunity costs/lost contribution and credit administration costs and bad debts losses at minimum which minimizes high cases of accounts receivables. Therefore private hospitals need to develop an effective debt collection policy that is based on the nature, business environment and missions of the hospital. The study further recommends that hospitals should periodically review their credit policies professionally so as to ensure that the benefits accrued from trading in credit are not outweighed by the associated risks. The study recommends that the firms should be involved in all aspects strengthening the credit selection procedures.

Key Word: Credit, Credit Management, Credit Risk, Accounts Receivable

Effect of Corporate Governance On Return On Assets Of Listed Companies In Nairobi Securities Exchange.

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Abstract

Corporate governance has received much attention research among academia and practitioners and they have prescribed the contribution of corporate governance on return on assets. Extensive literatures on the relationship between corporate and return on assets have given mixed results where some supports or contrasts the existing theories. This study was meant to investigate the effects of corporate governance on return on assets among companies listed in NSE from 2010 to 2020. Specifically, the study sought: To ascertain the effect of board independence on return on assets among listed companies in NSE. To determine the effect of board size on return on assets among listed companies in NSE. To examine the effect of board tenure on return on assets among listed companies in NSE. To ascertain the effect of CEO duality on return on assets among listed companies in NSE. To establish the effect of multiple directorship on return on assets among listed companies in NSE. The study adopted causal study design and had a sample of 35 companies which were listed between 2010 to 2020 and they continuously traded in NSE. Secondary data was collected from audited annual financial statements. SPSS was used as the main data analysis tool. Both descriptive and inferential statistics were applied. Descriptive methods included mean, minimum, standard deviation and maximum while inferential methods were correlation and regression analysis. The study found that board independence had a positive and significant relationship with return on assets. Secondly the study found negative and insignificant relationship between return on assets and board size. Thirdly there was a positive and significant relationship between CEO duality and return on assets. The study found an inverse though insignificant relationship between board tenure and return on assets. The study found a positive and non-significant relationship between multiple directorship and return on assets. The study concluded that there is need to enhance board independence and customize board size to meet company specific needs.

Key Words: Corporate Governance, CEO duality, Board Size, Return on assets, Board Independence

Green Finance Strategic And Sustainable Development: An Empirical Study

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ABSTRACT

Sustainability in organization has become an interest to organization in this 21st century. This enable the organization to live for more years that short term performance. Organization are concerned with both short-term and long-term performance. The paper investigates the impact of green finance management on sustainable future business development. Sustainable resource theory as well as resource based view theory was adopted with resource for competitive advantages as well as sustainable development. Sustainable resources theory explains the important of resource that have long term gain for future development. Green finance strategic management has been supported by the theories since it enables organization to be sustainable as well as competitive in nature. A desk review of existing literature indicated that green finance strategic management is modern approach to dynamic macro-environment that has significantly affected organization. According to the finding green finance strategy is a rising concept that is concern with ensuring a sustainable finance planning that would ensure that sustainable development. Green finance strategic management approach would enable reduction of environmental degradation, cost reduction, clean energy, new job opportunity, reuse and recycling of materials and manageable future development. The study recommended that firms should adopt green finance in managing finance by purchasing as well as developing products, processes and resource that have long term utility and environmental friendly. Future recommendation of studies to conducted in green strategic management and performance of organization.

Key terms: Green Finance, Green Strategic Management, Sustainable Development.

Greening the General Ledger: Environmental Management Accounting in Bomet University College, Kenya.

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ABSTRACT

The United Nations Division for Sustainable Development (UNSD) broadly define Environmental Management Accounting (EMA) to be the identification, collection, analysis and use of two types of information for internal decision making: physical information on the use, flows and destinies of energy, water and materials (including wastes); and monetary information on environment-related costs, earnings and savings. EMA is the accounting profession's response to concerns about sustainable development which, according to the Brundtland Commission (1987, p. 43), is "development that meets the needs of present generations without compromising the similar needs of future generations". During the past 25 years environmental issues have grown to become a major concern for company managers. All developing countries, Kenya included are faced with the twin problem about saving the environment and economic development. Indeed Kenya is a member of the Paris agreement or Conference of Parties (CoP) protocol on combating climate change. Yet, although notions of 'eco-efficiency' and 'sustainable development' have entered discussions in boardrooms throughout the world, practical execution of these ideas still remains at an early stage of development. With the long-established environmental degradation of resources, climate and ecosystems that is apparent in the 21st century, it is expedient to posit the question : "How can EMA prompt behavioural change on the scale and speed necessary to avoid catastrophic environmental damage?". Therefore, this study seeks to show how accounting, as the language of business and the source of information, can meet the criteria of sustainability. The study will be guided by Legitimacy Theory, Stakeholder Theory and Positive Accounting Theory. The study will focus on Bomet University College, a Kenyan higher education institution whose mission, vision and niche emphasize notions of "Green University for sustainability" and "Green Economy for sustainability". Data will be collected by Interview Schedule and a Data Collection Sheet that seeks to tease out information on four types of management accounting techniques identified the UNSD for the identification and allocation of environmental costs: input/outflow analysis, flow cost accounting, activity based costing and lifecycle costing. The interviewing will focus on the departments or functional services leaders grouped according to processes, and within the processes, the specific environmental activities. Based on this data, a preliminary dictionary of the most important environment-specific activities will be prepared. Content analysis will be undertaken on the data to summarize into themes and subthemes. The study conclusions may contribute towards measuring and managing environmental costs at organization level, since 'what you cannot measure you cannot manage'.

Key words: Environmental Management Accounting; Public Universities; Sustainable Development; Environmental costs

Effect of Green Innovation Practices on Environmental Performance of Manufacturing Firms in Kericho County

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ABSTRACT

Many companies nowadays are taking in to consideration green practices in every aspect of business due to emerging of environment concerns worldwide. Unfortunately, this is not the case in most of the developing countries, and Kenya is no different where only guidelines and incentive are available. Innovation is relatively a new concept that deals with untraditional approaches to conduct different business activities. Green innovation is important in organizations because it saves environment from pollution, save energy, and recycling the useless materials. The purpose of the study is to examine the impact of green innovation (green product innovation, green process innovation) on environmental performance of manufacturing firms. This research utilized the resource-based viewtheories. The study targeted 400 respondents from 107 registered manufacturing firms and stratified and simple sampling method will be used to get sample size of 120. Primary data was collected using questionnaires. Data was analyzed using descriptive and inferential statistics. A positive relationship existed between green innovation and environmental performance[r = .625, p<.05]. The practices of green economic and green management have significant benefits at the level of the national economy and achieve significant savings at the level of the manufacturing sector.This study confirms the impact of green innovation in environmental performance. Green innovation in products and processes require deepenprinciple of practices and behaviours in industrial enterprises, as the management is the main driver in thisapplication through the adoption of practices and behaviours of environmentally friendly policies.

Key Words: Green, Innovation, Practices, Environmental, Performance, Manufacturing, Firms

Green Entrepreneurship as a Panacea for Financial Sustainability of Businesses in Kenya Today

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ABSTRACT

Financial Sustainability of Businesses in Kenya has increasingly become an agenda in today's businesses and entrepreneurship debate. In the financial sector, sustainability is necessary due to the critical role played by the sector in national development. In Kenya, financial institutions are financing investments in the various sectors of the economy. These investments have significant impacts in creating the need for adoption of sustainable finance. In spite of this, in Kenya millions of businesses Food, water, and energy demand are all increasing as the world's population grows. In an increasingly resource-constrained world, this rise will carry with it increased demands, putting social and environmental structures to the test. Kenya, as a developing country, has not been spared, and the current environmental problems need a fundamental shift in how we think about growth and development, as well as green entrepreneurship. Cities are expanding, new industries are sprouting, energy demand is skyrocketing, and the demand for green, sustainable businesses is as strong as it has ever been. This study therefore, attempts to examine the role of creative green entrepreneurship, green washing and institutional structure on the financial sustainability of Businesses. It further deepens the understanding that green entrepreneurship among businesses is a critical asset for sustainability through creative, green washing and institutional green entrepreneurship. Explanatory study was used targeting 6,423 businesses in Kenya with a sample size of 376. The findings of the research revealed that creative green entrepreneurship at ($\beta = 0.10$, $p < 0.05$), green washing at ($\beta = 0.158$, $p < 0.05$) and institutional Structure at ($\beta = 0.128$, $p < 0.05$) all had a positive and significant effect on the financial sustainability of Businesses. Conclusively new business models can make an important contribution to the Green Growth transition. While some new business models involve large firms, others are small start-up firms that seek to exploit technological or commercial opportunities that have been neglected or not yet explored by more established firms. It's concluded that the three constructs further enhances the financial sustainability of Businesses in Kenya as confirmed by the study findings and that much needs to be done to enhance its sustainability awareness to improve the impact and return on investment of today's businesses.

Keywords: Green entrepreneurship, Panacea, Financial Sustainability, Businesses and Today

Government Involvement in Support of Green Entrepreneurs in Kenya

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ABSTRACT

Globally, there is a growing interest in development of a green economy (low carbon) as an avenue of protecting our environment. Surprisingly, expansive review of documented studies on green entrepreneurs and Small Micro Enterprises (SMEs) has been left in the hands of individual entrepreneurs who end up making a lot of assumptions. Looking at the bigger picture of the underlying them, we find that less importance has been put and thus changing business initiatives in the ever competitive environment is misguided. It is against this motivation that the present study aims at establishing Government initiatives that have been put in place to support green entrepreneurs in Kenya. The study will be guided by sustainability transition theory. Descriptive research design will be used in this study. Primary data collection instruments, namely interview schedule will be used in this study. In addition, the study will use semi-structured interviews to investigate with green building companies and policy makers. Data analysis be done through thematic analysis. It is hoped that the findings of the present study will inform policy making and implementation. Further, the findings are hoped to be of use to funders of entrepreneurship programmes in Kenya and beyond. Interested researchers and academicians might also use the findings as a basis for future research.

Key words: Green entrepreneurs, Government initiatives, Kenya.

Security Threats, Mitigation and Framework for Cloud Computing applications: A Theoretical review

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ABSTRACT

At this moment in time, when small and medium scale businesses (SMBs) and large scale enterprise face an economic downturn, the labour and capital required for stand up servers and license software may be prohibitive an accelerated shift to the cloud seems inevitable. With maturity of cloud computing in year 2019, security is still a key cloud concern also for late adopters in developing countries especially in Sub-Saharan Africa. Cloud provider achieve economic of scale by building a large data center and then sharing resources to all the customers. Due to the shared environment, customers information and data are exposed to all forms of vulnerabilities and threats, there is a need for provider to ensure that every customer is identified, and that non should have the ability to see or change another customer's data. Organizations are worried on how to develop adequate mitigation strategies for effective control measures and to balancing common expectation between cloud providers and cloud users. The objectives of this study is first to identify common threats in cloud computing, second to provide threats mitigation techniques in cloud computing practice and finally propose frameworks for identifying vulnerabilities in cloud computing applications. The study adopted a systematic literature review in cloud computing environment. Study Result categorized cloud threats into three categories; confidentiality threats, Integrity threats and Availability threats. Confidentiality threats identified were; Insider user threats, External attacker threats and Data leakage, while Intergrity threats were; Data segregation, User access and Data quality, and finally Availability threats are; Change management, Denial of service threat, Physical disruption and weak recovery procedures. The study further identified several cloud computing threats mitigation techniques and tools which are; Information-centric security, High-assurance remote server verification, Privacy-enhanced business intelligence, Virtual Private Network (VPN), Internet Protocol Security (IPSec), Secure Socket Layer (SSL) Encryption, Intrusion Detection system (IDS) and Service Management Application Programming Interface (SMAPI). Finally the study proposes five frameworks for assessing, monitoring and alerting instance of suspected exploits and attacks for known and unknown vulnerabilities that compromise security, privacy and integrity in cloud environment. The proposed frameworks are; Automated Patches Generation (such as genesis, prophet and Kali), PolyVaccine, Customer Security Controls Framework (CSCF), ShieldGen and Zero-day Attack Signature Management Infrastructure (ZASMIN).

Key words: Security Threats, Mitigation, Framework, Cloud Computing

DECENTRALIZATION OF HUMAN RESOURCE MANAGEMENT PRACTICES AND EMPLOYEE PERFORMANCE IN CONSTITUTIONAL COMMISSIONS IN KENYA

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JKUAT

ABSTRACT

There are several different practices that are performed by HRM but all these practices are interrelated: planning, acquisition, development, compensation, integration, maintenance, and separation. Despite devolving of HR practices being found to be advantageous, there is little research that has been carried out to establish the impacts of devolving HR practices on the performance of employees. It's from this background that this study aims to determine the influence of decentralization of HRM practices on employee performance in constitutional commissions in Kenya. The study sought to: examine the relationship between decentralization of discipline management and decentralization of training on employee performance in constitutional commissions in Kenya. Descriptive research design was adopted. The study targeted the Head of Departments and Human resource co-ordinators and technocrats in all the 10 constitutional commissions. Therefore the target population was a total of 206 respondents. All the 206 subjects formed the sample for the study. Data used in the study was collected using structured questionnaires. Data collected was tabulated and analysed using SPSS Version. Qualitative data was analysed using descriptive statistics such as frequencies, means, standard deviation and was used to show the characteristics of the variables being investigated. The study also computed inferential statistics which included bivariate correlation and multiple regression analysis and they were used to show the association between the dependent and the independent variables. Analysed data was presented using tables and charts. The study found that decentralization of discipline management significantly affects employee performance in constitutional commissions in Kenya. Decentralization of training significantly affects employee performance in constitutional commissions in Kenya. The study recommends constitutional commissions in Kenya to embrace the strategy of discipline management and provide training opportunities to its employees. This is achieved by offering various forms of training such as management development, soft and technical skills development and well as training on personal effectiveness.

Key Words; Decentralization, Discipline management, Employee Performance, Human Resource Management, Performance, Training.

**PERFORMANCE APPRAISAL PRACTICE OPPORTUNITY AND EMPLOYEE RETENTION IN
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ABSTRACT

The rate of employee turnover can affect the performance of an organization and therefore employee retention is considered of utmost importance globally. Hence this study aimed to investigate the influence of performance appraisal practice on employee retention in selected beverage processing firms in Kenya. The study was conducted using survey design to establish the relationship between variables. The target population was 2940 employees of beverage firms in Kenya and the sample size was 352 employees which was calculated using Taro Yamane's formula. The study adopted structured questionnaires to get answers of the research questions. Questionnaires were used to collect data and later on analysed using descriptive statistics and presented in frequency tables. The pilot study was carried out at Kipchabo tea factory in Nandi County. It was established that performance appraisal practice showed a positive correlation with retention of employees in beverage processing firms. The study recommended that the management of organizations should put in place performance appraisal policy, gives performance appraisal feedback timely and should be conducted on regular bases to enable management and employees to plan for better execution. The study recommended that issues should be addressed so that to prevent employees from perceiving performance appraisal systems as discriminatory, punitive and judgmental processes, where cronyism and biased considerations dominated objectivity and thus ineffectiveness of the appraisal system. Lastly, the study was to be of great significance to beverage processing firms, academicians, researchers and policy makers.

Keywords: performance appraisal practice, employee retention, beverage processing firms

THE EFFECT OF MOTIVATION PRACTICES ON EMPLOYEE PERFORMANCE IN PUBLIC SECONDARY SCHOOLS IN KENYA

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ABSTRACT

The central aim of the research was to investigate the effect of motivational practices on employee performance in state owned schools. This research was guided by Herzberg's Two Factor Theory, Mc Gregor's Theory X and Theory Y, Abraham Maslow's Hierarchy of Needs, Transformational leadership Theory and Human Capital Theory. The target population consisted of 23,147 employees in public secondary schools in Kenya. The research assumed a mixed research design. A sample size of 393 respondents was used through stratified random sampling. The strata represented all the teachers. The instruments used in the study were the questionnaires. Structured questionnaires were developed and pretested; a pilot study was conducted to help establish content validity and reliability of the instrument. Content validity of the instruments was verified by experts from the university department while reliability of the research data collection tool was assessed using constant of alpha that needed to be at least 0.7 in social sciences. From the findings, the reliability test of motivation test was 0.760. In view of this, the research instrument was reliable. Statistical information collected was explored with the aid of statistical tool of analysis. Both descriptive and inferential statistics that included the mean, frequencies, correlation and regression analysis were used. From the study findings, the correlation between motivation practices and employee performance in Public secondary schools in Kenya was positive and significant. The study concluded that there is a measurably positive connection amongst motivation on employee performance. On recommendation, the study encourages management of public secondary schools to proactively motivate teachers to improve their performance. The inquiry was done in public secondary schools in Kenya. Future researches are encouraged to cover private secondary schools and compare the findings. The study forms a basis for reference as empirical literature by researchers and any other interested parties in future.

Key words: Motivation, employee performance, public secondary

Diversity in Gender And Diversity In Age Among Workers On Employee Performance In Selected Universities In Kenya.

Author Amos k Chepserson and Dr Nkaabu Clement

Abstract

The study assessed the diversity in gender and diversity in age among workers on employee performance in selected universities in Kenya. The objective of the study were determine the effect of diversity in gender and employee performance in an organization and to determine the effects of diversity in age among workers and employee performance. Social identity theory was used to ground this study. Explanatory research design was adopted, and a survey was conducted on selected Universities in Kenya. Self-administered questionnaires were distributed to 371 teaching and non-teaching administrators of Universities out of which 305 equal to 82% of the sample size were returned and were used in data analysis. Cronbach alpha was used to test the reliability of the instruments. Descriptive statistics such as mean, standard deviation and Pearson correlation analysis was done. Regression analysis was done to test the hypotheses and to establish the effect that each variable has on employee performance. The study findings indicate that gender diversity ($\beta_1 = 0.314$, $\rho < 0.05$), age diversity ($\beta_2 = 0.239$, $\rho < 0.05$) have significant and positive effect on employee performance. This study therefore supports and contributes to the social categorization theory and human resource management literature. The implication is that institutions and firms should consider hiring employees from socially diverse backgrounds to be able to achieve higher employee performance.

INFLUENCE OF COMPETITIVE TENDERING ON THE PERFORMANCE OF DEVOLVED SYSTEM OF GOVERNMENTS IN KENYA

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Abstract

Purpose -The purpose of this paper is to examine the influence of competitive tendering on the performance of devolved systems of governments in Kenya.

Design/Methodology/Approach- A cross-sectional approach is adopted with primary data collected. The data yielded a response rate of 229 from 10 devolved systems of governments Kenya which were drawn mainly from supply chain and finance departments. The data collected was put through rigorous statistical analysis to test content validity as well as reliability. Further, simple linear regression model was used to test relationships between competitive tendering and the performance of devolved systems of governments in Kenya.

Findings- The finding proposes that a successful execution of competitive tendering increases the performance of devolved systems of governments. The use of competitive tendering method assist devolved systems of governments in attracting huge pool of suppliers where they can choose their potential suppliers competitively and thus instill public confidence on the accountability of public resources.

Research limitations/implications-The study provides relevant knowledge in formulating policy framework on efficient and effective management of public procurement process in devolved systems of governments. Also, the study shows that if competitive tendering method is properly embraced, it will increase the performance of devolved systems of governments. However, the study limited only to the competitive tendering method and yet it can only be applied in certain thresholds. Thus, a similar study can be conducted in the same sector but using other alternative procurement methods.

Originality/Value The study provides a holistic approach in the application and use of competitive tendering method for improving performance of devolved systems of governments. Also, the identified gaps provide future direction in research and encourage the adoption of competitive tendering method as a way of promoting accountability of use of public resources in the devolved systems of governments.

Key words- Competitive Tendering, Performance of devolved systems of governments in Kenya, Simple regression

Effect of Asset Tangibility on Financial Performance of Firms Listed at the Nairobi Securities Exchange, Kenya

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Abstract:

The contribution of listed firms to Kenya's economic growth cannot be gainsaid. Statistics show that the firms contribute about 10% to Kenya's GDP annually. However, there is evidence to show that a number of Kenya's publicly listed entities are performing poorly with up to 23% of the firms either being delisted or suspended from trading in the last ten years. This threatens Kenya's economy which greatly depends on the financial performance of the firms. Previous studies attempting to solve the issue focus on several firm characteristics with the effect of asset tangibility receiving minimal attention. The present study sought to evaluate the effect of asset tangibility on financial performance of firms listed at the Nairobi Securities Exchange. The study was conducted in the Nairobi Securities Exchange (NSE)'s sixty-four firms listed at the NSE as at December 2019, 38 of which had been continuously listed for period of study. The research was limited to the period January 2008 to December 2019. The study employed multiple regression and hierarchical multiple regression techniques to determine the effect of the selected firm characteristics and firm performance measured by ROA and Tobin's Q. Results showed that the effect of asset tangibility on financial performance is significantly negative ($\beta = -0.1355$, $p = 0.0000$) indicating that holding all factors constant, a unit increase in asset tangibility leads to a 13.55% drop in financial performance as measured by ROA. It was further found that the effect of asset tangibility on financial performance measured by Tobin's Q is significantly negative ($\beta = -0.2587$, $p = 0.0000$) implying that a unit increase in asset tangibility leads to a 25.87% decrease in financial performance as measured by Tobin's Q. It is concluded that asset tangibility is a significant negative contributor to the financial performance of the firms listed at the NSE. It is recommended that the listed firms reduce the amount of non-current assets and increase their asset tangibility so as to improve their financial performance.

Key Words: Asset Tangibility, NSE

SUB THEME: SUSTAINABLE GOVERNANCE AND STEWARDSHIP

Influence of Traditional and Cultural Institutions on Environmental Conservation In Kenya, The Case Of Moiben, Uasin Gishu Cuntly.

Sally Burer & Leonard Koech

ABSTRACT

Religious beliefs, traditional beliefs, cultural norms and practices play a crucial role for the successful conservation of the environment and specific organisms especially in the developing countries. The natural environment and resources are under serious threat and at least cultural taboos and their sanctions have helped to check abuse of the environment at least among the local people. Religious beliefs, cultural norms and practices are often aligned with today's conservation ethics, and it is imperative that they are upheld as they are critical in the wise conservation and management of natural resources. It is the rural communities of the world, the preservation of the environment has a direct link to the culture of the people which they pass it from generation to generations. This study aimed to survey the influence of cultural institutions on environmental conservancy within Moiben constituency. The main objective of the study was to establish the influence of indigenous education on conservancy. Survey research design was employed and sample unit were heads of household in Moiben constituency. The study established that formal education cannot provide a platform for better conservation of natural resources because of its target population. Indigenous education is part of peoples' cultural and social identities, well-being. The study therefore recommends that: traditional institutions should provide a considerable protection of ecosystems and biodiversity without government restrictions.

Key words: Traditional and cultural institutions, Environmental conservancy, Sustainable development

RELIGIOUS LIBERTY CONSCIOUSNESS AMONG SIAYA-KISUMU SEVENTH-DAY ADVENTIST CHURCH MEMBERS

Kenneth Uki, Catherine Buteyo & Tabitha Sewe

ABSTRACT.

Religious liberty, an aspect of human rights, refers to the individual freedom to determine her own relationship to any religious association or tenet. Its protection is one of the primary rationale for governance. The inability to proffer effective communication of the sanctity of religious liberty, in its form as a constitutional and legal stipulation, is one of the primary reasons for its abuse. Abuse continues even at a time when the inviolability of human rights has gone global. Infringement of religious liberty is not restricted to the Seventh Day Adventist Church Members (Adventists) though. The study seeks to examine religious liberty violations in relation to the flow of information within the Adventists' Church. What are the media of communication employed by the Church as an organization and their effectiveness in propagating religious liberty? The research focused on Central Nyanza Conference (CNF) covering the two counties of Siaya and Kisumu where 435 respondents out of 22000 baptized members were interviewed, which is 0.02% of the total population. To obtain data, questionnaires, interviews and focused group discussions were used. Data was analyzed using the descriptive method. The study recommends the best way to manage information flow between the church leadership and the faithful on matters related thereto. The leaders need to be urged to acquire more knowledge, increase the use of local content and language and use all the media available.

Key word: Religious liberty: Seventh day Adventist Church: Communication