Research and Innovation News

A Souvenir Publication from the Division of Research, Innovation and Outreach

Issue No. 8 December 2021
The Vision of Kenyatta University is to be a dynamic, inclusive and competitive centre of excellence in teaching, learning, research and service to humanity.

The Mission of Kenyatta University is to provide quality education and training, promote scholarship, service, innovation and creativity and inculcate moral values for sustainable individual and societal development.

Kenyatta University is a community of scholars committed to the generation and dissemination of knowledge and cultivation of wisdom of the welfare of society.

Truth, Creativity, Excellence, Self Reliance, Innovation, Equal Opportunity, Corporate Governance, Institutional Culture, Competitiveness, Academic Freedom and Respect for Diversity, Sensitivity and responsiveness to societal needs and the right of every person to knowledge.

UNIVERSITY FUNDAMENTAL STATEMENTS

VISION STATEMENT

MISSION STATEMENT

IDENTITY STATEMENT

CORE VALUES

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Kenyatta University is a dynamic, inclusive and a globally competitive centre of excellence in teaching, learning, research and service to humanity. Despite the challenges of COVID-19, the University has continued to provide a conducive and enabling environment to support researchers at different levels to their career and research lifecycle. Through the Division of Research, Innovation and Outreach (RIO), the university remains committed to its core mandate of research and service to the community by increasing the output of cutting-edge research that is creative, collaborative, translational, multidisciplinary and cross-disciplinary aimed at contributing to the national development agenda as well as global commitments.

The Division of Research, Innovation and Outreach is close to a decade since it was established. We therefore welcome you to this souvenir publication where we showcase close to a decade of research and innovation excellence. We particularly give secular trends highlighting notable achievements and efforts by the University Management Board, Schools, Departments, Directorates, members of faculty, staff and students as well as key stakeholders in significantly contributing to the University’s Research and Innovation agenda since the establishment of the Division of RIO close to 10 years ago.

The publication covers a wide range of topical stories and news including but not limited to funded research and development grants, dissemination of research findings, community engagements, incubations and innovations as well as visiting scholars.

We wish you a healthy festive season and a peaceful-prosperous New Year 2022.

Prof. Vincent Onywera, PhD, ISAK 2
Registrar Research, Innovation and Outreach and Editor - in - Chief
A JOURNEY OF RESEARCH EXCELLENCE
Kenyatta University’s Strategic and Vision Plan 2016-2026 identifies Research, Innovation and Outreach (RIO) as one of the core mandates of the University. How has the university ensured that RIO flourishes?

There has been exemplary performance by both faculty and students in various areas of Research, Innovation and Outreach. This has been made possible by putting in place a conducive environment backed by policies, strategies and initiatives that support Research, Innovation and Outreach. Our faculty and students are currently implementing innovative programmes.

Kenya’s Vision 2030 and the Big Four Agenda provide a roadmap for transforming Kenya. How has research at Kenyatta University contributed to Kenya’s vision 2030 and the Big Four Agenda so far?

The overarching goal of Kenya Vision 2030 is to transform Kenya into a newly-industrializing, middle income country providing a high quality of life to all its citizens in a clean and secure environment. Higher learning institutions had to align their priorities with the Vision 2030. The pillars of the vision informed our approach in research as the country had to make deliberate decisions backed by research and scientific evidence.

What are your thoughts on the Big Four Agenda vis-a-vis research at Kenyatta University?

The Big Four Agenda focuses on food security, affordable housing, manufacturing and affordable universal healthcare for all. The Agenda has catalyzed our research priorities as a leading learning and research institution in the region. Through our various schools and departments, our research teams have been very active in finding solutions to the perennial societal problems including food shortage, climate change, health, and affordable housing. As of July 2021, the university has been implementing various innovative research activities supported by the Government of Kenya, regional and international funding agencies. The contributions of faculty members to the Big Four Agenda is evidenced by key projects including:
• Interdisciplinary striga management approaches;
• Enhancing agri-businesses, livelihoods and environment through better management of major pests and diseases of horticultural crops in eastern and central Kenya;
• Determination of Levels of Ionizing Radiation in Human Habitat, Water and Food: A potential cause of the rising cancer incidences in Kenya;
• Uptake of preventive measures, sero-surveillance and complementary management of COVID-19 in Kenya;
• Banana Paper: commercializing eco-friendly packaging and sanitary towels;
• An integrated approach to advanced research on locally developed and safe genetically modified Foods.

Sourcing for Research Grants has become globally challenging. How is Kenyatta University responding to this challenge?

Kenya has witnessed tremendous growth in the number of public and private universities. This has resulted in demand for qualified faculty to teach and supervise the increasing number of students at undergraduate and postgraduate levels. Consequently, stiff competition for research grants to support postgraduate students and for the generation of new knowledge has ensued. This trend has been witnessed globally. With increased population targeting the same donors, it is evident that competition will continue.

To respond to this, Kenyatta University has strategically signed partnerships and MoUs with leading learning and research institutions across the globe, which have bolstered our chances of attracting research funding. We have also created specialized centers and directorates domiciled in the Division of Research, Innovation and Outreach to spearhead our resource mobilization activities and strategies, including capacity building of faculty on techniques of writing competitive grant proposals and formation of multi-institutional multi-sectoral research collaborations.

Research Ethics and Safety is an important global issue. How is Kenyatta University ensuring research ethics meet international standards?

Research is specifically the process of establishing facts or reaching new conclusions which are realized across all disciplines including health, humanities, engineering, natural sciences, and education among others. Further, establishing these facts or reaching new conclusions involve participation of humans and animals; commonly known as the subjects. To ensure our research process follows the acceptable international standards, Kenyatta University has established the Center for Research Ethics and Safety. This is one of the specialized centers in the Division that ensures all undergraduate, postgraduate and donor funded research activities emanating from Kenyatta University comply with the national and international allowable research ethical considerations. The center is also NACOSTI accredited and vets research proposals from other institutions to ensure safety, integrity and confidence of the participants and research subjects.

What is your niche as a research institution?

Over the years, Kenyatta University has been associated with the training of secondary school teachers in the arts, humanities and sciences, a recognition that we continue to take pride in. We have also cognizant of the demands for higher education in different fields, the university has significantly invested in health education (nursing, pharmacy, and medicine), engineering and technology, legal education and Architecture and the Built Environment. Just as we have carved our niche in the training of secondary school teachers, we are progressively carving niches in health, biochemistry and biotechnology, engineering and Medicine.

PROF. PAUL K. WAINAINA
VICE CHANCELLOR,
KENYATTA UNIVERSITY
How has Kenyatta University responded to the COVID-19 through research and innovation?

The COVID-19 pandemic has negatively impacted all sectors of the economy and society and continues to be a global challenge that has affected our university in various ways. As a higher learning and research institution, we have responded to the challenges and opportunities created by the pandemic to advance knowledge and provide solutions. Through partnerships with other organizations, we are in the process of developing a low cost mechanical ventilator for respiratory illness and improved nasal swabs for use in managing COVID-19. Kenyatta University is also manufacturing hand sanitizers for internal use while our faculty members are also engaged in various research activities supported for example by the National Research Fund-South Africa and the National Research Fund-Kenya. Through the Department of Psychology and the Directorate of Wellness and Rehabilitation Services, the university has been instrumental in assisting the staff and students in coping with psychosocial challenges associated with COVID-19. Despite the daunting challenges brought by the pandemic, we appreciate it has also provided opportunities to catalyze research, innovation and outreach. We are cognizant of our duty and responsibility in providing interventions in the national and international response to the COVID-19 pandemic.

How is the Vice-Chancellor's research and innovation grant supporting budding researchers?

The Vice-Chancellor’s grant has been instrumental in providing seed money for early career researchers to venture into research. Through the initiative, early career researchers are introduced into the competitive world of grant writing and the reviewing process. The reviewers’ comments are shared with both the successful and unsuccessful applicants for necessary improvements. With such contributions from experienced reviewers, the applicants get training in writing winning research proposals.

What are the next steps for Kenyatta University in terms of research roadmap?

With the increasing paucity of resources, there is need for institutions of higher learning to invest in the commercialization of research outputs either through licensing or creation of new ventures. Kenyatta University is keen on creating wealth through commercialization of research outputs. This is our next big agenda as a university.

Division Journey in Research Innovation and Outreach; Moving forward by looking backwards

There has been exemplary performance by both faculty and students in various areas of Research, Innovation and Outreach. This has been made possible by putting in place a conducive environment backed by policies, strategies and initiatives that support Research, Innovation and Outreach.
The Division of Research Innovation and Outreach is journeying towards a decade; what can you say about the journey?

Over the years, driven by our vision and mission statements, we have consistently strived to create an optimum environment enriched with a vibrant research culture which encourages and promotes excellence in research, scholarship and innovative endeavors. Our mandate as a division is aligned to the Sustainable Development Goals, AU strategic Objectives as outlined in the Agenda 2063: The Africa We Want, the Big 4 Agenda and Kenyatta University Strategic and Vision goals. To ensure that our responsibilities are effectively realized, the university management has created specialized centers and directorates to spearhead the division’s specific goals and objectives.

Our success is evidenced by the increased number of research grants awarded by the Government of Kenya and our international partners to the university; established specialized research laboratories; increased capacity building activities for staff and students in research; increased funding for innovations; creation of new partnerships and dissemination of research findings through publications, seminars and conferences.

What is the impact of the specialized Directorates and Centers within the Division to Kenyatta University and other stakeholders?

The University management created specialized Directorates and Centers within the Division to ensure maximum delivery of the university strategic goals and objectives. These Directorates and Centers have proved vital in resource mobilization; policy formulations for the national and county governments; creation and management of research partnerships and collaborations; management of intellectual property rights; student mentoring and innovation management.

PROF. F. Q. GRAVENIR
DEPUTY VICE CHANCELLOR,
RESEARCH, INNOVATION AND OUTREACH
How does the Division of Research, Innovation and Outreach link to the university fraternity?

The Division offers research and innovation related support to researchers, postgraduate students and donor partners. We link to our stakeholders (international and external) in complementary manner through our specialized directorates and centers. The directorates and centers supplement the activities of other divisions (Academic; Administration; and Finance and Development) to ensure realization of the university objectives. Our responsibilities as a division further support the University Vision, Mission, Statement and Philosophy Statements in furthering the university’s unique identity.

Managing research grants require attention to demands of different research funders; how has the division ensured this?

The Division has put in place clear guidelines to ensure research grants are used and managed as per the contractual agreement between the researcher, the funder and the university. It is the position of the university that research grants must be administered in a manner that ensures the realization of the research objectives and to the satisfaction of the funder. Our experience indicates that prudent management of research grants builds trust and results in repeat awards; and also prevents the university from being blacklisted by donors.

Current trends in research demand multidisciplinary approaches, how is the division supporting researchers on this?

The University notes that a multidisciplinary approach to research is beneficial in providing different unique approaches and perspectives in solving societal problems; encourages teamwork among researchers from different departments/institutions; and yields high impact research. The university has put in place measures to support researchers to collaborate with their peers from other departments/other institutions. Our collaboration process goes through a thorough due diligence and background check to ensure that our reputation as a learning and research institution is maintained.

Does the university administer grants allocated to non-members of the university community?

Kenyatta University has a vibrant Center for Innovation Incubation and University-Industry Linkages that admits innovators from all over Kenya. Most of these innovators are supported by Kenya National Innovation Agency (KeNIA) and other development partners; and a significant majority of them are not affiliated to the University. As an institution responsible for nurturing of talents and supporting innovation, we have taken the responsibility of administering such grants. This partnership has supported innovators and given the donors the necessary confidence to continue supporting new and variable ideas.

Over the years, driven by our vision and mission statements, we have consistently strived to create an optimum environment enriched with a vibrant research culture which encourages and promotes excellence in research, scholarship and innovative endeavors.
You have been here through the transformation of the Research structure, what do you think have contributed in the growth you have witnessed in the University in terms of research?

The structures have made it easy for researchers to get assistance in terms of services they need for example to develop and submit proposals, to engage prospective partners, to locate funding opportunities, to process research funds, seek ethical clearance among other activities. This before was very tedious and frustrating, at some point I was managing the System for Award Management SAM account and anyone trying to make application for US Government funding would have to establish who is managing it and also you have to worry about its renewal and updates. As a researcher this can wear you down, but I am happy now we have a one-stop place for all the online proposal submission systems. My only worry is coming up with a fundable proposal and the concerned office will take care of the rest.

Also our system is clear in facilitating implementation of research project, the grant administration process is clear and helps the approving authorities to clear funding request in a considerable amount of time. In other institutions this is not the case which affects the deliverable timelines and can put the researcher in logger head with the funder. The fact that research funds are separated from other University funds is also very advantageous for our institution, a researcher does not worry that their funds for project implementation will be redirected by their Institution for other activities.

There are other aspects such as the incentive to publish in credible journals which motivates the staff to do so which has a positive impact in their career progression as well as the visibility of the University.

The open door policy when one wants to consult, this good and comforting especially for those starting out.

What areas do you think need improvement going forward?

My colleagues and the system too are not fully aware of the benefits that accrue from doing research, the research component is still passive with more focus being put on teaching. I would like to see research being weighted equally to teaching, this will help in increasing the research output, improving our teaching content and methods as well as mentoring upcoming researchers. Other than publications other outputs of research productivity are not considered, I would really like to see this change in future.
What positive improvements do you think can be made collectively and at an individual level to further our progress?

Firstly, we need to highlight the importance of research and engage all staff across the University we can increase activities showcasing research and innovation like schools, departments and sections can have a research day or week where they display what they have done so far.

Research should be looked at as a core activity and not something that is done on the side. At the institutional levels the visibility of impacting the society by providing products and services improve the wellbeing of our communities. The financial returns coming from commercialization of products and services generated from research is a benefit for both the researcher and institution we need to see more encouragement for research activities.

Further benefits I have seen and enjoyed include:

Departments being able to get resources to enrich their laboratories, teaching aids and other fringe benefits that allow the department/school to undertake small activities without the burden of seeking finances from the Central administration. This goes a long way to uplift the profile of the said department.

Opportunities for exchange, mobility and scholarship for both staff and students increasing the internationalization and exposure of all.

At the individual level aside from impacting the society through the research work there are additional resources for oneself. Supplemented by research, one’s profile is elevated, network circle grows among other immerse benefits.

Tell us about the importance of research partnerships/collaborations and networks

Collaborative research is more prevalent and preferred not only here but it is a global trend that has taken root, simply because the benefits outweigh the challenges. These include:

- Combined expertise and resources enabling the team expand the breadth of their research and the impact transcends a wider community;
- There is a positive correlation between collaborative papers and a high level of citations particularly if the authors were from different institutions;
- Generating outputs that have an impact on policy, practice, industry, or the general public can increase your chances of getting funded. In addition, some funding bodies now give priority to international and industry-academia collaborations;
- Working collaboratively can help one meet potential future mentors, additional collaborators and even employers we all aspire to grow;
- Collaborations are opportunities to learn new skills, make new friends, gain a new perspective, and join stimulating discussions and with experts in your field or complementary fields;

As an institution, we have not fully exploited the benefits of research collaboration and partnership but we have started and as we slowly realize the advantages I hope we will pursue these approach more aggressively.

Striga, Sorghum and Steven are more like Synonyms tell us more about that?

I would like to attribute my nurturing as a scientist to my mentors, the late Prof. Jesse Machuka and Prof. Nelima Signa in the USA.

A model that works and which worked for me is as a master student you pick an area, or your supervisor narrows down an area for you to focus on then expand your expertise under the guide of your mentor. Start off early focusing on a specialization and curve a niche in that space, develop the experience and build a network, starting off with the network inherited from your mentors and then expand it as you move. One cannot be an expert in several areas just pick up one.
Why Striga, there are many different weeds?

Well, I did not find striga it found me, it started out in plant biology with focus on food improvement and security, but then, I encountered this beautiful menace that was obscuring the bigger goal and my interest was sparked.

What do you foresee as the next big step in your research?

I hope to use the knowledge and information we have accrued over time, there is a lot of interest in it and commitment from funders. I look forward to when we shall put the first genome edited sorghum on Kenyan soil hopefully this will be in the next couple of months. Ultimately when I see farmers grow improved sorghum which has come from science increasing their yield by some extra kilogram will be the ultimate satisfaction and maybe then I can retire.

In your research journey so far, what proud moments can you share (grants, Publication, outreach)?

My students, when I see them make a career for themselves, when they grow in their own right, Every time I see them graduate it brings me joy and accomplishment; Recognition of my work by peers; the award of 2020’s Royal Society Africa Prize award for best scientific research; getting a publication recognized by a scientist in an advanced lab and them wanting to know more about my work just to mention a few.

What about the challenging moment?

The number of grant application I have lost. If I had a shilling for every unsuccessful grant application, then I will not need to look for research funding; rejection of papers published; loss of colleagues and student who have had potentials along the way.

Engaging in research is not a linear process, Engagement in science is a long term investment there are setbacks probably more than the success but once you have an ultimate goal slowly work towards it enjoy the small gains, use the setbacks as opportunity to improve and you will definitely be rewarded.

On your major challenge, what is your advice for those who have given up early in their quest for research funding?
Even the best get rejected, mostly for funding awarded to maybe one or two projects. However I have learnt to look at the positive I use the reviewers’ remarks to improve my proposal in anticipation for the next call. The fact that one is responding to a call indicates that they already have an insight to grant writing a valuable skill and by continuously attempting to respond to calls you always get better.

Getting a positive response on the first attempt is not easy and not guaranteed but you only get better with every attempt. Always put your best foot forward, avoid the minor yet costly mistakes like misspelling a title, or the funder’s name. Think like the funder align with their goal, anticipate the need they seek to fulfil through the funding. Aspects of sustainability and inclusivity are key, read the mood like now it is sustainable development, climate change the Big 4 and have a clear route to impact this are critical to funders now.

Why is it taking too long to see products of research in the market, even though as a nation and institution we have been engaged in research for a long time?

Earlier on our mindset was not on commercializing research but that has changed, the incubation Centre here was broaden our perspective of research output beyond publication in an impactful journal and conference presentation. Looking at research as an incoming earner is now being actualized, Even for me as an individual it took a lot of convincing from the now Director of the Incubation Centre to see I can use the results of my research to fund my next research and earn something from it too. The entrepreneurial mindset is lacking but a lot of conversation is happening and training as well.

“The abundance of problem in Africa is good news for researchers.” This is statement that was made by Prof. Gravenir in some collaboration meeting what is your take on it.

Yes it is an irony but true and sadly I do not think we have taken advantage of that. Researchers in the developed countries are getting funding to come and do research in Africa. The Gates Foundation, USAID, UK and German Government have departments to aid development in Africa, So what we need to do is look at the developmental problems which are in abundance and craft fundable proposals and seek out the funding that is available in plenty.

Words of wisdom to students, ECR, and even experienced researchers

Experienced researcher have an obligation to mould and mentor the next generation of researchers, as a supervisor and mentors we need to identify our successors early and train them to write papers, write grants with them, you have seen that with students winning IFS and NRF grants, encourage and walk with them.

For the ECRs and Postdoc students

Have an academic figure head, be focused develop a well outlined goal, curve a niche, do not get dejected when you get your paper or grant application rejected. You can approach someone to serve as your mentor, I approached experienced researchers like Prof. Chris Shisanya and Prof. John Okumu who are my senior and I got and still get invaluable insight from them. They are knowledgeable and willing to help and important people to learn from. You can avoid making a mistake that your predecessor made just by your interactions with them.

As for me, I approached Prof. Shisanya informally and Prof. Okumu formally through an email I was lucky to get positive feedback. This might not be the case for you. Your preferred mentor might say no but that should not stop you, most of the established researchers are happy to take on a mentee.

What is your favorite science joke or statement that you bounce back on

More of a statement that my mentor used to tell me whenever I bounce an idea on her, she used to say, steven just do it, if you don’t someone else will. So every time I go back to that if there is something I can do and I am going back and forth with it. I avoid procrastinating.
Kenyatta University secured an infrastructure grant in June 2019, to establish the National Phytotherapeutics, Research, Upscaling and Quality Assurance Research Centre, from the Kenya National Research Fund (NRF) to be a Centre of excellence at Kenyatta University.

NPRC is mandated to develop a suitable habitat for further research and commercialization of research products and processes emanating from Kenyatta University and other institutions in the country and region. Thus the Centre addresses the Big 4 Agenda by promoting universal health coverage through manufacturing of quality herbal medicine.

The inaugural Director of NPRC Prof. Nicholas Gikonyo is the Principal Investigator and Coordinator of the NRF grant. In June 2021, the National Research Fund Board of Trustees (NRF BoT) visited Kenyatta University to specifically inspect the progress of implementation of the grant.

NRF Board of Trustees and KU staff on 8th June 2021 at the NPRC during inspection of the facility

### Sections of NPRC

The NPRC consists of the following major sections:

1. The Dry and Wet laboratories
2. The Quality Assurance section
3. The Microbiology Section
4. The Up-Scaling Unit

The facility has been equipped with high-end instruments and equipment to facilitate profiling of metabolites in herbal materials, creating fingerprints of herbal drugs and establishing the quality of phyto-therapeutics.

In the long term, the NPRC is working towards bridging the gap between research and industry, as well as create knowledge-based job opportunities through phytomedicines.
Centre for Research Ethics and Safety (KUCRES) – protecting the rights and welfare of research subjects

In an effort to promote high ethical standards in research the University established the Centre for Research Ethics and Safety that houses;

- **The Ethics Review Committee (KUERC)** that is accredited by the National Commission for Science, Technology and Innovation (NACOSTI). The KUERC’s responsibility is to ensure that appropriate steps are taken to protect the rights and welfare of human participating as subjects/respondents in a research study. The primary role is to safeguard the dignity, rights, safety and wellbeing of all actual and potential human participants within the research enterprise;

- **The Animal Care and Use Committee**, focusing on the handling, housing and transportation of animals used in laboratory research and

- **The Biosafety Committee** to handle research protocols involving genetically modified organisms, biosecurity and biological waste management.

These committees together are an important section towards the realization of the vision and mission for advancing quality of scientific and scholarly research that meets global standards; and ultimately contributes significantly to the development agenda, both nationally and internationally.

The number of proposals reviewed, has continued to grow over the years due to increased awareness of the importance of applying ethical principles in research. The enhanced Centre is committed to ensuring the continued development and implementation of research protocols aimed at ensuring the highest scientific and ethical standards.
Directorate of Innovation Incubation and University-Industry Linkages – Fostering a culture of innovation and entrepreneurship for a prosperous nation

Number of Startups since the inception of the centre

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<th>Year</th>
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<td>2019/2020</td>
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<tr>
<td>2020/2021</td>
<td>20</td>
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The directorate works to foster the culture of innovation and entrepreneurship through the establishment programmes that have strong links with industry. The directorate further enhances coordination of Research and Development (R&D) agenda to avoid duplications, stimulate additional private R&D investments, and exploit synergies and complementarities of scientific and technological capabilities. Some of the success stories from the include: Ecodudu, Zalisha, Flexpay Arigiene, Onceinc and Visviva.
Portfolio of Start-ups at **Chandaria BIIC**

Source: Chandaria BIIC, 2021
Portfolio of Intellectual Property

Source: Technology Transfer Office, 2021
Directorate of Research Support and Dissemination - supporting research resource mobilization and sharing of knowledge

The center supports the enormous potential at the University to deliver high quality research that is relevant to societal needs through logistical support, training for research skills development, information on grants and other opportunities, and the development of research collaborations. **Since its inception, the directorate has been critical in enriching the research culture within the university through its services and resources.**
The newly established Global Tourism Resilience and Crisis Management Centre is a regional hub located at Kenyatta University.

**The Centre is tasked with:**

1. Researching, capacity building, creating, producing and generating knowledge, toolkits, guidelines and policies on tourism resilience and crisis management.

2. Supporting the countries in Eastern Africa with destination preparedness, management, and recovery from disruptions and/or crises that negatively impact on tourism and threaten economies and livelihoods.

CS Ministry of Tourism and Wildlife Hon. Najib Balala (seated 2nd from right) CAS Tourism and Wildlife Hon. Joseph Boinet (seated middle) and VC Prof. Paul Wainana with senior Ministry of Tourism and Wildlife officials and KU management team during the launch of Centre at Kenyatta University.
Kenyatta University through the Office of the Vice-Chancellor has been supporting faculty members and technical staff with seed money to strengthen research and innovation culture in the University.

The Vice-Chancellor’s Research and Innovation Grant, popularly known among Kenyatta University researchers as VC’s grant, funds competitive research and innovation proposals with potential impacts in: Food and Nutrition Security; Health and Well-being; Safety, Security and Peace; Affordable Housing; Manufacturing, Material Science; Value addition, Entrepreneurship and Poverty Eradication; and Quality Education and Training.

The VC’s research grant has supported faculty and technical staff in various thematic research as highlighted below.

### Summary of VC’s research Grant by thematic area

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<td>Food and Nutrition Security</td>
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<td>Value addition, entrepreneurship and poverty eradication</td>
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<td>Health and well being</td>
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<td>Manufacturing and material science</td>
<td>0</td>
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FOOD SECURITY HEALTH VALUE ADDITION MANUFACTURING
2

RESEARCH NEWS
KU scholar awarded an NIH R01 grant to study drug resistance in bilharzia (schistosomiasis) causing parasites in western Kenya

Dr. Eric Ndombi of the Department of Medical Microbiology and Parasitology, School of Medicine was awarded an R01 Research Grant (International Research in Infectious Diseases) by the United States of America’s National Institute of Health (NIH).

The grant worth US$ 785,622 will run for 5 years and is anchored in the US National Institute of Allergy and Infectious Diseases (NIAID), one of the 27 centers and institutes that make up the NIH.

NIH is the largest public funder of biomedical research in the world, investing more than $32 billion a year to enhance life, and reduce illness and disability.

The collaborative study that focuses on “Characterisation of drug resistance in field collected schistosomes” involves Kenya Medical Research Institute’s Centre for Global Health Research (KEMRI-CGHR), Kisumu and Texas Biomedical Research Institute, San Antonio, Texas, USA, with Dr. Ndombi as the principal investigator.

Dr. Eric Ndombi
Schistosomiasis, also commonly known as bilharziasis or snail fever, is a waterborne parasitic infection that damages internal organs. The most common symptoms are blood in urine and/or feces, an enlarged liver, diarrhea, abdominal pain, weakness, and anemia. It is one of the Neglected Tropical Diseases (NTDs) that is widespread in several parts of Kenya, including areas around Lake Victoria. The disease is estimated to infect 6 million people in the country, with a further 15 million at risk of infection. Despite many years of mass drug administration with the commonly used drug known as praziquantel, infection frequency and intensities have remained high in certain villages around Lake Victoria making them persistent hotspots. Dr. Ndombi and his team will investigate variation in drug responses in the adult parasite worms collected from patients around these areas to determine if drug resistance might be one of the factors contributing to the "persistent hotspots."

"Treatment of schistosomiasis has relied on the anthelmintic drug praziquantel (PZQ) for more than a generation. PZQ is the drug of choice for the treatment of schistosomiasis."

The knowledge gained from the study will be critical to on-going elimination efforts of the diseases through mass PZQ treatment and will provide valuable information for the development of new anti-schistosome drugs. The project will also stimulate development of research capacity in genome sequencing, computational biology and anthelminthic pharmacology in Kenya. NIH funded research has led to breakthroughs and new treatments, helping people live longer, healthier lives, and building the research foundation that drives discovery.
Kenyatta University COVID-19 related project was among 80 projects across 17 African countries that were selected for funding under the COVID-19 Africa rapid grant fund. The multidisciplinary project is under the lead of Prof. Paul Okemo of the department of Biochemistry, Microbiology and Biotechnology the award of about USD 100,000 (Ksh 10M) will facilitate investigations on the uptake of COVID-19 preventive measures, the anti-severe acute respiratory syndrome coronavirus 2 antibody commonness in the Kenyan population, the biochemical profiles and clinical characteristics of COVID-19 patients as well as the antiviral activity of selected Kenyan medicinal plants.

The project is being implemented in collaboration with partners from Kenyatta National Hospital, Kenya Medical Research Institute-KEMRI University of Pretoria and Harbin Medical University is expected to deliver several outputs that will be important in the fight against the pandemic, these include;

- A report on the uptake and attitudes of the Kenyan population towards the Ministry of Health COVID-19 infection prevention measures and recommendations for strengthening the evidence-based strategies on how to improve public health outcomes;
- Socio-demographic characteristics of a cross section of Kenyan COVID-19 patients for enhanced disease surveillance in Kenya;
- Immunity status and persistence report from the COVID-19 patients and recommendations to relevant authorities to inform full resumption of normalcy in Kenya over a two year period;
- Report on antiviral activities of selected medicinal plant preparations for improved case management and health outcomes in COVID-19 patients in Kenya among others.

The other Co-Investigators in KU include Dr. Gladys Mwangi, Dr. James Ogutu, Dr. Samuel Chege, Dr. Lister Onsongo, Dr. Peris Thamaini and Dr. June Madete.

Prof. Paul Okemo, Project leader
KU Researcher takes lead in exploring interventions to reduce severity of COVID-19 pandemic

Dr. John P. Oyore, of the Department of Community Health and Epidemiology was awarded a research grant of Kshs 18,156,000 by NRF – Kenya for a research study titled; ‘Optimizing parameters for the proper use of face masks to reduce severity of underlying infections for enhanced tolerance to COVID-19’.

Dr. Oyore is leading a team of multidisciplinary researchers to conduct the study that aims at investigating possible natural protectants that can be used to coat face mask surfaces to reduce microbial contamination due to prolonged use. The project recognizes that many Kenyans, especially in the informal sectors, perform their routine duties where they have to deal with excessive sweating, talking, shouting and/or touching the face masks. Others, particularly during rainy seasons unknowingly or due to the nature of their work find their face masks permanently moistened. By being in tight proximity to the face and receiving warm moistened breath from the nose, face masks also naturally assume the body temperature together, these parameters are conducive for breeding of diseases causing bacteria from the individual wearer, atmosphere and polluted environments. The project will also seek to reduce bacterial contamination from prolonged use the mask.
Exploring geothermal power beyond generation of electricity

One of the geothermal wells drilled at Paka Hills in Silale, Baringo ©James Keogh for AFD
Technical University of Denmark (DTU), Kenyatta University, the Geothermal Training Centre of Dedan Kimath University of Technology, The University of Dar-Es-Salaam and a consortium of leading energy companies in Kenya, Denmark and Zambia have been awarded a research grant by the Ministry of Foreign Affairs of Denmark and administrated by Danida Fellowship Centre under the project “Widespread Use Of Geothermal Energy in East Africa”. The project coordinator and lead researcher is Prof. Fredrik Haglind of the Department of Mechanical Engineering, Technical University of Denmark (DTU). The KU team comprises of Eng. Elias Ako of the department of Energy Technology and Prof. Willis Ambusso of the department of Physics.

Whereas geothermal energy is known to be widespread along the East African Rift Valley, its exploitation as an environmentally friendly form of energy in the region is still limited to a relatively small area in Kenya. Furthermore exploitation of geothermal resources is limited to generation of electricity leaving out a host of other forms utilization of geothermal energy.

The research project aims to change this by developing and demonstrating novel technologies exploration, development and management of low to intermediate temperature geothermal resources for direct use (DU). Applications of these technologies will focus on smart agriculture, industrial production and generation of electrical power. Working with the regional office of the United Nations Environmental Programme (UNEP) led by director Dr. Meseret Zemedkun, the team is expected to identify and develop efficient cost effective technologies that will boost food production in rural communities, generate electrical power to support industries that will lead to reduced emission of green-house gases while increasing the usage of geothermal resources as a renewable source energy in the region.

The overall project funding is DKK 11,999,757 (Danish Kroners), an equivalent of about Kshs. 250 Million. KU will receive DKK 4 million for purchase of research materials, publication and attendance of conference and support of two (2) PhD students.
Following Adaptation Money - KU researcher investigates how climate adaptation finances are governed and implemented
Dr. Eric M. Kioko of the Department of Environmental Studies and Community Development (School of Environmental Studies) together with researchers from the Danish Institute for International Studies (DIIS), Kenya Climate Innovation Centre, University of Nairobi (Climate Change and Adaptation), and REPOA (Tanzania) won a grant of DKK 11,999,997 under the project, “Governing Climate Adaptation for Transformation”.

In the era of climate change and its linked effects particularly in Africa, how finances meant for climate adaptation are governed, managed, and implemented at the local-level is an area of concern. Astonishingly, over 90% of funds meant for climate adaptation are either not allocated for implementing adaptation activities, are used as overheads in centrally managed projects, or otherwise lost during the transfer or implementation process from national to sub-national institutions.

The project seeks to address this problem by investigating the cause of the gap between the scale of decision-making and the scale of action or implementation, the implications for adaptation and further an analysis of how (de)centralized modes of governance influence the distribution and use of finance for adaptation during implementation will be done. A comparative study of Kenya and Tanzania will be carried out by the project’s team of Danish, Kenyan and Tanzanian researchers who combine scholarly excellence in climate change adaptation, anthropology, public administration, and political economy.

The project’s premise is that devolved governance of climate change adaptation leads to a less skewed spatial distribution of financial resources, although devolution alone may not alleviate political conflict and produce solutions that are better tailored to local conditions. The overall goal is to provide evidence for how and by whom decisions are taken, and on what and where adaptation funds are spent.

The project’s results will impact the prospects for adaptation finance becoming transformative; implementation of activities being done transparently and in an accountable and effective manner, benefiting those most vulnerable to climate change. The project will be carried out over a period of 5 years and offers fellowships for 2 doctoral fellows and 4 Masters Students.
Connecting agro pastoral food culture research to livestock commercialization policy

Herd of cattle in Baringo County the study's location site
Dr. Eric M. Kioko from the Department of Environmental Studies and Community Development (School of Environmental Studies) is representing Kenyatta University in a 2-year multidisciplinary research project awarded GPB 77,955 by the UK Arts and Humanities Research Council. The project aims to understand how livestock and agricultural commercialization policy in Africa can be better connected to research on the food cultures of agropastoralist people.

The research was informed by the noticeable disconnect between many policies dealing with livestock sector commercialization and modernization, and research on agropastoralist food culture, despite the practices of production and consumption which connect them. A typical example would be commercialization of the dairy sector is sometimes difficult to connect to gendered associations of milk trade in the cultures of people. The result is that pastoralist people, and specific groups such as women or those of given ethnicities, may end up not fully benefitting from livestock sector development, or may even be disadvantaged. Thus, there is a need to draw connections between research on food cultures and practices of pastoralism and development oriented policy on the livestock sector in Africa.

The project aims to define a new research agenda connecting policy on livestock sector development and research on agropastoralist food cultures and practices. This will be done through participatory photography and community-based dialogue with pastoralists and policy makers in Kenya. This will further set out the agenda for such research and engagement.

The project partners include the Institute of Development Studies (IDS, UK) led by Dr. Imogen Bellwood-Howard, University of Cape Coast led by Dr. Kaderi Bukari, The Source Plus (TSP) (a non-profit public interest company working in Baringo county with agro pastoralist communities) led by Bronson Eran’ogwa, and The land Farmers’ Cooperative (representing the Ilchamus and Aror communities in Baringo County).

Other KU team members working together with Dr. Eric M. Kioko include Dr. Mary Baaru, Dr. Peter Wangai, and Dr. Salome Muriuki
Prof. Grace Wamue-Ngare of the Department of Sociology, Gender and Development studies was awarded the Association of Common Wealth Universities (ACU) Coventry University Fellowship Grant of GBP 5,000 to address Female Genital Mutilation (FGM) in the country through inter-community models. The project is keen to borrow intervention measures that have worked in curtailing the FGM practice which despite being outlawed in Kenya, is still widely practiced among some Kenyan Communities. The project borrows from initiatives that have successfully eliminated FGM in parts of Central Kenya; and deploying the strategy to the targeted communities and families. The objective of the project is to have communities that once upheld FGM as an initiation into womanhood, but successfully shifted their mindset against it, share their strategies. In this, the Gikuyu will provide mentorship, emotional, and socio-cultural support to their Kisii counterparts who are still engrained in it. Prof. Wamue-Ngare hope we project outcomes will influence policy makers to adopt and implement Inter-Community approaches in reducing FGM’s prevalence.

The ACU Fellowship grant focuses on the UN Sustainable Development Goal no.5.
A Kenyatta University Scholar wins the 2021 Commonwealth Peace and Reconciliation Challenge Grants

Dr. Olivia Achieng Opere of the Department of Educational Foundations was awarded the 2021 Association of Commonwealth Universities Peace and Reconciliation Grant amounting to GBP 2,500. The grant is awarded to ACU members in support of initiatives that advance peace, reconciliation, and indigenous knowledge. It targets academic and professional staff and supports collaborative work focused on either of the two main strategic priorities of the Commonwealth Peace and Reconciliation Network: Historical memory and trauma and Institutional reform and indigenous knowledge.

Dr. Opere’s project sought to equip students and faculty members with knowledge and skills on conflict resolution for the sake of peaceful coexistence. Guidelines for training the university community on peace building competencies were developed and further a two-day Peace Building Competencies and Reconciliation Workshop targeting student leaders from Kenyatta University and Africa Nazarene University was conducted successfully.
Building urban community networks for **sustainable cities in Africa** (UComNetSus)

**UComNetSus** project is one of the 13 projects that were competitively selected for funding by the Belmont Forum for the 2020 call. The project is funded under the theme ‘Pathways to Sustainability’ with an emphasis on Collaborative Research Actions (CRA) by multidisciplinary and multinational experts.

The project focus is on the sustainability of six African cities namely, Kumasi, Lagos, Kigali, Dar es Salaam, Mombasa and Nairobi. Dr. Peter W. Wangai of the Department of Environmental Studies & Community Development is the overall project lead and will coordinate project activities of the partner institutions namely; the Kwame Krumah University of Science and Technology (Ghana), Georgetown University (USA), Nature Cares Resource Centre (Nigeria), University of Rwanda (Rwanda), University of Dar es Salaam (Tanzania), and Kenyatta University, South Eastern Kenya University and University of Embu in Kenya.

Africa is rapidly urbanising. Urban problems such as informal settlements, poor sanitation, motorized and human traffic, pollution and waste have emerged. Further, there is increased poverty and degradation, and a decline in human wellbeing, especially in the cities. Counteractively, researchers and practitioners have previously attempted to address the problems. However, the attempts have been frustrated by the complexity of the problems. This is because urban problems are socioecological in nature and defy solutions formulated along disciplinary and departmental lines.
The project will thus apply transdisciplinary approach in finding practical solutions for the sustainability of African cities. As a first step, the project will mobilize stakeholders in African cities, who will form a model “urban community of practice”. This will enable co-conceptualization of urban problems, co-designing of methodological approach, co-creativity and co-implementation of the solutions. On long-term, the project will minimize trade-offs, while optimizing synergies and interconnectedness in the realization of the sustainable development goals. Ultimately, the project will build urban resilience against global environmental crises and improve human wellbeing in cities.
KU’s department of Zoological Sciences part of the “Capacity Development for Mobilization and use of Data on Endangered Bird species in Kenya” Project

Ms. Carolyne Wachu Maina
BID Fellow 2021 - Graduate Student (PhD)

Ms. Purity Chepkirui
BID Fellow 2021 - Graduate Student (Masters)
The Biodiversity Information for Development Programme (BID) project was among 18 projects selected in Sub-Saharan Africa for funding by the European.

The project which was awarded EURO 39,960 emphasizes on the importance of training in establishing a local community of practice for bird conservation professionals and students in Kenya. To improve data acquisition, data analysis and research skills of this community, the project’s three main objectives focused on data about endangered bird species in Kenya include;

- Integrating Global Biodiversity Information Facility (GBIF) data into conservation decision-making via conservation policy briefs created in collaboration with graduate students, early-career scientists, and conservation managers;
- Enhancing the use of BID data by graduate students and early-career scientists through the publication of peer-reviewed articles;
- Strengthening the capacity of conservation managers to collect policy-relevant biodiversity data through citizen science.

Four Kenyan students were admitted into the BID Fellowship Program 2021 of which two (2) are from Kenyatta University. The two students from the department of Zoological Sciences are both undertaking studies in Animal Ecology at Masters and PhD levels.
Prof. John Mugubi, Dean, School of Creative Arts, Film and Media Studies, together with Dr. Heather Flowe, School of Psychology, University of Birmingham, United Kingdom have secured funding of **Euros, 129, 811.36** (Kshs. 19,471,704) from the Arts and Humanities Research Council (AHRC) to undertake research aimed at documenting the cumulative harms that survivors endure in the aftermath of sexual violence. The research is designed to study the nature of sexual violence and change the way that evidence is gathered to prevent crimes and to protect survivors, thereby addressing SDG15 and SDG16. This follow-on project will disseminate research via a participatory documentary film project that aims to impact social perceptions of sexual violence and survivors via the creative economy. Non-academic partners on the project are the **Survivors of Sexual Violence in Kenya Network**, and the **Wangu Kanja Foundation**, located in Mukuru Kwa Njenga slums in Nairobi, Kenya.

The participatory film will create space for survivors to reflect on their individual and collective strengths and concerns. The transformative participatory approach provides survivors with empowerment facilitating the development of confidence while eliminating oppressive beliefs, labels, stereotypes, and stigma. It is hoped that the impact activities will empower survivors, giving them a voice, and in doing so, promote meaningful change in how the public perceives the crime and survivors, and how authorities address these types of offences. The participatory film will document survivors’ experiences of devaluation and powerlessness in their personal, social, and community lives arising from sexual violence, allowing audiences in Kenya (i.e., the general public, policy makers and duty bearers), and internationally (e.g., in the UK, the National Priority Setting Partnership; which is a national network of survivors), the FCDO, PSVI; policy makers) to gain new insights.
Fostering the culture of innovation and entrepreneurship to alleviate youth unemployment

Dr. Ambrose Jagongo of the department of Accounting and Finance secured a grant of GPB 60,000 from the British Council following the development and design of the Innovation for African Universities (IAU) project, which is part of the Going Global Partnerships programme, to foster the culture of innovation and entrepreneurship within universities and facilitate the development of skills required to build industries, companies, products and services to address youth unemployment which is a growing global problem causing social inequality and leading to social vices, this is more pronounced in Sub Saran Africa (SSA).

In recognition of the problem of youth unemployment, the British Council made a call for proposals dubbed innovation for African Universities on the thematic area Youth Entrepreneurship Accelerator Programme (YEAP), a partnership comprising of Kenyatta University, representing SSA, Northumbria University representing UK, Entrepreneurship educators Foundation East Africa (EEFEA), an ecosystem player, and Technical University of Kenya (TUK) representing a fourth UK/SSA player, was among 24 projects that were successfully selected to be a part of the programme.

The programme aims to identify and ideate business acceleration services for the young entrepreneurs in Kenya which aligns to the University’s strategic pillar of fostering the culture of innovation and entrepreneurship through establishment of innovation and entrepreneurship programs that have strong links with the industry. Dr. Ambrose Jagongo, the project lead, will be working together with Dr. Fredrick Ndede, Director Embu Campus.
Kenyatta University received a refrigerated centrifuge worth Ksh. 1,000,000 from the German International Development Agency or Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). The GIZ through its Centre for International Migration and Development (CIM) supports returning experts in subject areas who have previously studied or worked in Germany to continue their research as well as mentor their peers and students. Dr. George Ochieng Asudi of the Department of Biochemistry, Microbiology and Biotechnology (BMB), the awardee of the equipment returned from his 3-year fellowship as an Alexander von Humboldt Postdoctoral Fellow at the Friedrich Schiller University of Jena where he was between 2017 and 2020.

The CIM Programme Migration & Diaspora (PMD) Coordinator, Cynthia G. Kamau during the equipment hand over session urged Dr. Asudi to continue supporting colleagues and students in his expertise, and to network with German professors and researchers for continued capacity building of staff. During the courtesy call Prof. Onywera expressed gratitude on behalf of the University to GIZ for the equipment and their continued to returning scholars keen to further develop their expertise as well as mentor other upcoming scholars.
The Registrar, RIO Prof. Vincent Onywera (L) officially receiving the equipment from CIM Programme Coordinator, Cynthia G. Kamau (R) at the Plant transformation lab. Looking on from right, Prof. Michael Gicheru, Dr. Mathew Piero, Dr. George Asudi, Prof. Richard Oduor and Prof. Steven Runo.
Kenyatta University through the Department of Zoological Sciences received Class II A2 Biosafety hood cabinet worth Ksh. 1,800,000 from the Federal Ministry of Economic Cooperation and Development through the Alexander von Humboldt Foundation of Germany. The Biological safety cabinet was handed over to the University by Ms. Ursula Koos, the Head of the Department of Culture and Education, German Embassy in Nairobi, on 10th February 2021.

The equipment was obtained through a subsidy grant which is a reserve of Humboldtians Fellows who have successfully completed their Research Fellowships in Germany awarded by the Alexander von Humboldt Stiftung/Foundation. The Equipment was secured through Dr. Joshua Mutiso of the department of Zoological Sciences following his award of the prestigious International Georg Forster Research Fellowship.

During his fellowship, Dr. Mutiso whose academic and research specialization is Immunology including Infectious Diseases, Cancer and Diabetes was involved in research on cancer prevention and treatment at the German Cancer Research Center (DKFZ) in Heidelberg. His studies at the Centre focused on the molecular pathways of cancer cell apoptosis and target sites of anticancer agents which has an application in cancer diagnosis, development of anticancer agents, monitoring of disease course and drug efficacy.

Upon his return Dr. Mutiso has continued with his research on cancer, sharing his acquired skills with faculty members as well as training students. The Class II A2 Biosafety hoods are mainly used for handling pathogenic biological samples or for applications that require a sterile work zone secured will enable handling of Cell cultures, including Cell lines – normal, cancerous, and disease causing pathogens. This will ensure the possibility of research on Molecular Biology, Cancer and Infectious Diseases.
Upscaling production of low-cost mechanical ventilators

Kenyatta University won a grand challenges Africa grant for the Upscaling Production of low-cost Mechanical Ventilators. The USD 200,000 award will facilitate the verification and validation of the locally produced ventilator and renovate existing manufacturing unit to enable the production of the low-cost Mechanical ventilators referred as TIBA-VENT that were designed at Kenyatta University by students from the School of Engineering under the mentorship of Dr. June Madete. A benchmarking visit to manufacturing units at Dedan Kimathi University of Technology Industrial Park and Gear Box will inform plans to renovate the current manufacturing unit at Kenyatta university (KU) School of Engineering and Technology (SET) to a state-of-the-art good manufacturing practices GMP compliant manufacturing unit. This will facilitate manufacturing of some of the Mechanical Ventilators followed by a user perception and market analysis of the ventilator in five different national and county referral hospitals with ICU facilities as well as stakeholder engagement workshops of the locally manufactured Mechanical ventilator to maximize uptake.

Dr. June Madete, Department of Electrical and Electronic Engineering
Medical devices are critical to providing quality patient care. Imagine going to hospital for a malaria test and not having it done because one of the testing equipment – Microscope- is not functional due to a broken down adjustable knob which is not readily available for replacement since the costs are inhibitive and the procurement process lengthy. This is the current situation in medical facilities across various resource limited countries making it challenging to access basic medical devices and spare parts to maintain them because of prohibitive purchasing costs, time lags in their procurement and skills in repair. What if the broken down knob requires some little local designing, engineering and 3D printing to provide an inexpensive replacement knob making this critical device useable again.

Kenyatta University’s Department of Electrical and Electronic Engineering under the lead of Dr. June Madete is collaborating with Kijenzi Kenya Limited a local manufacturing hub that focuses on 3D printing of spare parts for medical equipment to identify the barriers/challenges to health system adoption of innovation specifically 3D printing. An in-depth analysis of the health care sector to assess the potential impact of Kijenzi on this sector. Cross sectional study of level 3 and 4 county health facilities using a health systems approach to identify the medical equipment, clinical needs, infrastructure support needed for equipment to function, health workforce skills, and routine maintenance/repair procedures.

The research and development (R&D) impact vouchers project seeks to incentivize collaboration between early-stage companies and public research organizations, the goal is to improve the products and services that companies seek to bring to market in low-income settings or to help them anticipate or overcome technical and operational obstacles.
The collaboration which was awarded Kshs. 4,150,350 will work to:

- quantify the impact of localized spare parts 3D printing manufacturing on healthcare facility operations
- Building medical equipment database to identify equipment amenable to local 3D spare part manufacture and
- Identify non-health market sectors and institutions in the public good that would benefit from localized, digital manufacturing

The Research & Development (R&D) Impact Vouchers program is supported by Villgro Africa and Canada’s International Development Research Centre.
Researchers from Kenyatta University, University of Nairobi (UoN) and Technical University of Denmark (DTU) secured a collaborative research grant worth Kshs. 87,198,353 (DKK 4,998,710) from the Danida Fellowship Centre for the research project that aims at identifying appropriate private and public schemes for collection and recycling of electronic waste from small scale, off-grid solar devices (OGS). The ultimate goal is to create economic value for local communities out of these electronic waste.

The KU project lead Dr. Christine Majale will be supported by Prof. Caleb Mireri, Dr. Godwin Opinde and Dr. Kariuki David Mugendi all from the Department of Environmental Planning and Management.
Since 2010, the off-grid solar (OGS) devices market in Sub-Saharan Africa has significantly grown reaching cumulative sales of around 130 million given this increasing sales, the solar electronic waste (SEW) being generated and disposed of is equally increasing at a similar pace, raising concerns about the environmental impacts and the overall sustainability of the OGS sector.

In Kenya, over 3,800 tonnes of SEW was discarded in 2020, placing Kenya as a regional ‘hot spot’ for SEW.

Moreso, OGS devices and their constituent components (including batteries) contain various hazardous materials, such as lead, cadmium, mercury and sulphuric acid, the disposal of which may cause serious adverse effects to human health and the environment. Further, there is limited research on how the breakdown, repair and disposal of OGS devices in the country is managed. This presents glaring gaps of information that is important in informing regulation and private sector initiatives aimed at improving the collection and recycling of SEW.

The project seeks to contribute to a circular economy by developing a more sustainable market model for sales and collection of OGS devices in Kenya and across SSA. Specifically, the project will contribute to achieving green growth by ensuring that production and sales of renewable energy solutions will also increase employment, improve livelihoods and reduce poverty in local communities, while avoiding harmful impacts on humans and the natural environment. It will also further feed into the Country’s political process through close engagement with key government agencies and stakeholders involved in e-waste regulation.

The collaborative partners in the project include University of Nairobi (Institute of Development Studies), and Technical University of Denmark (Department of Environmental Engineering)

Prof. Ulrich Elmer Hansen
Overall Project Lead
Technical University of Denmark

Photo credit: UNEP DTU Partnership
The International Consortium of Universities for Drug Demand Reduction (ICUDDR) and the International Society of Addiction Journal Editors (ISAJE) have a joint NIDA International Program-funded project to develop an academic course on writing scientific papers for publication in peer-reviewed journals. The course development project is part of a larger effort by ICUDDR and ISAJE to increase the quantity and quality of peer-reviewed publications by researchers outside of the United States and Europe.

Dr. Beatrice Kathungu of the department of Psychology was among the successful applicants awarded the grant of USD 5,000. The development of the course titled Publishing Addiction Science was initiated earlier in the year and was carried out with technical support from ISAJE and ICUDDR. The course has gone through all the stages of approval by the university including the Senate, and is currently ready for dissemination, first as part of the Post-graduate Diploma in Addiction Treatment Science (currently offered by the department of Psychology), and secondly as a specialization course open to Master’s and Doctoral students in Psychology and related departments of health and social sciences within Kenyatta University.
It is estimated that sanitary towels contain 90% of plastic, a lot which ends up in landfills since the disposal of menstrual products, in a climate-friendly manner remains a challenge. Limited research has been undertaken to outline the scope of this problem, yet women make almost half of the world’s population globally.

Dr. Jacqueline Kisato of the Department of Fashion, Design and Marketing (Principal Investigator) and Dr. Everlyne Wanzala of the Department of Pharmacognosy, Pharmaceutical Chemistry and Pharmaceutics & Industrial Pharmacy (Co-Principal Investigator) have secured a collaborative research grant amounting to approximately USD 80,000 from the PASET Regional Scholarship and Innovation Fund in partnership with ICIPE to undertake a research study on Enhancing biodegradable sanitary towel production through utilization of seaweed and banana pseudo stem residues: a value addition strategy.

The inter-disciplinary team comprising of partners from JKUAT and Busitema University-Uganda will create cellulose based hydrogel to increase the biodegradability of the female sanitary towel products. The project will compliment efforts of making biodegradable sanitary towel products from other plant cellulose materials funded by the government of Kenya through National Research fund (NRF) and add value to the sanitary towel products that are friendly to the environment. This is in line with the Kenya’s government initiative of providing affordable menstrual hygiene products to girls in primary and secondary schools in the country to ensure girls do not miss their classes during the menses. The project also helps in attainment of SDG 15 to protect the world’s ecosystem and can be replicated across other countries seeking a more biodegradable option for the female menstrual hygiene products.
The Leverhulme Trust-funded project ‘Grammatical variation in Swahili: contact, change and identity’ is a collaborative research project bringing together researchers based at the University of Essex (UK), SOAS University of London (UK), Kenyatta University, KU (Kenya) and the University of Dar es Salaam (Tanzania) with a cumulative funding of GBP 390,0000 for the 4-year project (September 2021 to August 2025). Dr. Fridah Kanana Erastus of the Department of Literature, Linguistics and Foreign Languages is the project’s Co-investigator at KU.

The project seeks to explore changes in the Bantu language Swahili due to various influences. Swahili is spoken by more than 100 million people across East Africa, where the language has long played an important role as a regional means of communication. In the present-day, Swahili is spoken in Tanzania, Kenya, Uganda, DRC, Burundi and Rwanda, as well as parts of Zambia and northern Mozambique. Despite its significant speaker numbers and regional importance, there has been no in-depth examination of present-day variation in Swahili, nor of its role in the linguistic, cultural and social identities of Swahili-speaking communities. This project seeks to address this gap by advancing our understanding of structural variation found in Swahili. It also seeks to better understand the effects of identity on structural variation, drawing on insights from this major African language.

**Project team**

The core project team consists of:
- Hannah Gibson (University of Essex, Principal Investigator)
- Fridah Kanana Erastus (Kenyatta University, Co-Investigator)
- Tom Jelpke (SOAS, Project PhD student)
- Lutz Marten (SOAS, Co-Investigator)
- Teresa Poeta (University of Essex, Post-doctoral Research Assistant)
- Julius Taji (University of Dar es Salaam, Co-Investigator)
Dr. Fridah Kanana Erastus has also secured a four-year collaborative project titled; ‘Equal Opportunities in Higher Education: Partnership for Institutional Change’ funded by DAAD (German Academic Exchange Service) amounting to EUROS 413,764.87. The project consists of a DIES (Dialogue on Innovative Higher Education Strategies) partnership between Freie Universität Berlin (FUB), University of Cape Coast (UCC) Ghana and Kenyatta University, Kenya.

Gender equality is at the heart of the struggle for equal opportunities. Equal opportunities practices are understood in this project as non-discriminatory policies and practices that allow access and progression for actors of marginalised social groups in higher education institutions.

To foster equal opportunities and avoid gender discrimination, universities must acknowledge and address their responsibilities and institutional management functions in order to produce interventions that will bring results. This includes the introduction of efficient equal opportunity policies and management structures, the empowerment of equal opportunity and gender actors and the consolidation of a quality assurance body, which will monitor its implementation. Part of the empowering of equal opportunity and gender actors resides in strengthening their capacities. Capacity building is about enhancing professionalization through information, tools and motivation that will allow these actors to promote, supervise and embed equal opportunity practices in their institutions.

From right, Dr. Pacifica Okemwa, (KU)Dr. Fridah Kanana, Mr. Jeff Onyame, Dr. Georgina Yaa Oduro, Mrs Janet Christabel and Dr. Amanda Odoi(UCC)
The project aims to increase equal opportunities in higher education by building institutional structures and expertise as well as exchanging knowledge and professionalizing existing gender equality actors. While gender equality is at the core of this endeavour, other inequalities and their relation to gender equality are addressed as well.

**Expectations**

Throughout the project, equal opportunity actors at the partner universities will network and undergo varying stages of sensitization, knowledge building and incorporation of intersectional perspectives to their work towards creating more equitable higher education institutions. An Action Plan for Equal Opportunity will be developed and a Continuing Education Program for Equality Officers established at UCC and a South-South knowledge transfer between KU and UCC. Beside the professionalization and improvement of the institutional practice towards equal opportunities, the project aims to foster global partnerships and cooperation between the UCC, FUB and KU by taking seriously the responsibility of universities in the development of a more just society.
Keeping tabs with the preventive, curative and rehabilitative strategies of Fistula management

Dr. John Samson Oteyo of the department of Psychology has secured a grant of Kshs.1,500,000 from Fistula foundation to undertake a 3 month study on ‘Trends and status of obstetric fistula care management in Kenya between 2010 to 2020’.

The study is being undertaken against the background that despite the decline in maternal mortality, there are women who suffer from severe pregnancy complication including obstetric fistula. Obstetric fistula is a serious neglected and debilitating condition affecting many women in Kenya, if it remains untreated, women face far reaching physical, psychological and social consequences. Government and other non-government organizations have intensified the efforts to end Obstetric fistula but still there are unmet needs as there are low treatment rates relative to existing backlog and new cases. However there is need to document concerted efforts of these organizations and government as an attempt to cultivate synergy among these organizations as they work collaboratively to improve the quality of life of the women exposed to obstetric fistula. Moreover, studies especially on sub-Saharan Africa indicate that after obstetric fistula surgery there are fistula recurrence, persistent fistula related symptoms, fertility challenges and other adverse perinatal outcomes. On basis of these negative health outcomes, the study aims to evaluate extent to which existing preventive, curative and rehabilitative strategies improve quality of life of fistula survivors.

Findings from the study may inform future programs in coming up with strategies in which access to obstetric fistula screening and care management services can be enhanced for improving quality of life of the women of reproductive age. The study will be conducted in sixteen counties and 21 hospitals where obstetric care is given. The study will focus on obstetric fistula patients, survivors, international and local organizations involved in care management, ministry of health both at national and county levels.

Dr. John Samson Oteyo
Investigating the **causes of doping** resulting from prescription medication

Kenyan athletes after an exemplary performance in one of the international competitions. ©News central Africa
Kenya is recognized globally for its dominance in middle, long distance running and marathon. However, this athletic prowess has attracted world attention that suspiciously believes Kenyan athletes may be using performance-enhancing drugs to boost their performance. In response to this, the Anti-doping Agency of Kenya (ADAK) conducted rigorous doping tests in 2019 and unfortunately, a number of elite athletes tested positive for prohibited substances. Some of these positive results have been involuntary for instance in 2019 a marathoner received a two years ban after a doctor treated him for malaria with medication containing traces of drugs on WADA’s prohibited list. Another case was of a Kenyan sprinter who was prescribed drugs for back injury, which were prohibited before participation in athletics because of being strong pain relievers. In both instances the doctors reported being unaware that the medication they prescribed were on WADA’s prohibited list or were not supposed to be used before participation in an athletic competition.

It is possible that some of these cases of health practitioners prescribing or selling over the counter drugs with prohibited substances to athletes could be prevented or reduced if general practitioners and Pharmacists are well versed with doping knowledge. Mr. Rotich Jonathan Kimtai, PhD student at the department of Recreation and Sports Management has secured a grant of USD 19,045 from the World Anti-Doping Agency to undertake a study that seeks to investigate anti-doping knowledge, attitudes and general practitioners’ or pharmacists’ experience with doping in Kenya and the study will be undertaken at select major athletic training camps which provide ideal locations of where athletes are likely to seek health support and possibly doping related advice.
Investigating the effectiveness of herbal menthol extract in treatment of Arthritis

James Kimani Kamau is a PhD student in the Department of Biochemistry, Microbiology and Biotechnology, secured a grant from IFS amounting to USD 14,680 for his research project titled ‘Anti-Rheumatoid Arthritis Potential and Mechanism of Action of Methanolic Extracts of Boscia Angustifolia A. Rich and Rhamnus Prinoides L'Hér in Wistar Rats’.

His study focuses on anti-rheumatoid arthritis potential of two medicinal plants which are used traditionally in the management of rheumatoid arthritis by the Maasai community in Narok County, Kenya.
Rheumatoid arthritis is a chronic inflammatory autoimmune disease characterized by synovial membrane swelling, joint pain and joint stiffness leading to severe disability and premature mortality. It also affects other body organs such as eyes, skin, kidney, heart and lungs. Globally, rheumatoid arthritis affects approximately 1% of the population and it’s more common in women than men. It is believed that both environmental factors such as cigarette smoking and genetic factors such as human leucocyte antigen genes contribute to its development and progression. Synthetic disease-modifying anti-rheumatic drugs are expensive and are associated with severe effects and therefore, the need for alternative medical interventions. Herbal medicines are regarded as alternative therapeutics as they have fewer side effects and are easily biodegradable. His study is designed to determine anti-rheumatic potential and mechanism of action of methanol extracts of *Boscia angustifolia* which has different local names including Mulele in Kamba, bware Luo, oloireroi Maasai, Lito –Kipsigis among others and *Rhamnus prinoides* as well as quantitative phytochemical composition and toxicological studies.

*Boscia angustifolia* has different local names including Mulele in Kamba, bware Luo, oloireroi Maasai, Lito –Kipsigis among others

*Rhamnus prinoides*, the shiny-leaf buckthorn commonly known as ‘gesho’

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James Kamau, PhD Student
School of Business Scoops a major DFID-funded Grant
The School of Business has won a major grant worth £118,590 (Kshs.17.7M) from the Department for International Development (DFID-UK) under the State for Foreign, Commonwealth and Development Affairs at the Foreign, Commonwealth and Development Office (FCDO) to undertake a study on “Understanding the Kenyan Start-Up Ecosystem”. The grant will run through May, 2022.

The overall objective is to generate up-to-date, high quality, detailed quantitative and qualitative evidence to support development programming, diplomacy and policy dialogue with regards to investing in and strengthening the start-up and innovation ecosystem in Kenya.

The study target are all the registered SMEs in Kenya across the 47 counties. The expected outcomes of the study include:

- Easier implementation of SME support strategies by stakeholders due to reliable database of SME start up
- Ease of doing business by start-up due to support of relevant policy
- Stronger business start-up ecosystem resulting from the research collaborations
- More sustainable and growth oriented SMEs due to resulting support systems

The project team includes

- Dr. Paul Sang - Dean and Co-Principal Investigator
- Dr. Stephen Muathe - Chairman and Principal Investigator
- Dr. Samuel Maina
- Dr. Lucy Kavinda
- Dr. George Kosimbei
- Dr. Sammy Letema
- Ms. Salima Kiriago
- Mr. Simeon Nyachae

Dr. Stephen Muathe - Chairman and Principal Investigator

Dr. Paul Sang - Dean and Co-Principal Investigator

Department for International Development
KU faculty receives a grant from Google

Dr. Stephen Waithaka, senior lecturer in the department of Computing and Information Technology (CIT) received grant funds amounting to $10,000 from Google. The funds are as a result of Google’s growing effort to support excellent research in academics. Kenyatta University through the department of Computing and Information Technology therefore intends to use these funds towards “TensorFlow (an interface for expressing machine learning algorithms and an implementation for executing such algorithms).
b) **Ongoing** Research

Promoting **sustainable banana production** among resource-poor smallholder farmers

Agriculture is currently facing an unprecedented challenge of producing sufficient and healthy food for the rapidly increasing human population under changing climate and limited resources. Banana is an important food crop in Kenya with the ability of producing fruits throughout the year hence providing a good measure of food security. Despite this, shortage of planting materials, climate change, agricultural malpractices like excessive use of fertilizers and pesticides among other factors have degraded the ecosystem and impacted negatively on banana production.

A team of researchers led by Prof. Omwoyo Ombori of the Department of Plant Sciences have been working to develop innovative approaches that exploit cost effective tissue culture and beneficial root-associated microorganisms (AMF) technologies in an effort to promote banana production among resource-poor smallholder farmers.

At the lab, cost effective growth regulator cultures were introduced to the different banana varieties. There was a 100% survival rate in cultivars that were treated with indigenous arbuscular mycorrhizal fungi (AMF) as well as commercial AMF, a commonly known bio-fertilizer that has a host of benefits which includes tolerance to host plants against various stressful situations like heat, salinity, drought, metals, and extreme temperatures. Additionally, next-generation sequencing was conducted in banana rhizospheric soil to determine microbial communities. The results showed high incidences of soil associated bacteria and fungi as well as plant pathogenic and plant beneficial bacterial and fungal Genera in the majority of the soil sampled.
Field survey that have been undertaken in the 3 study sites in Kisii, Nyamira and Embu counties have shown that the major challenges smallholder farmers are faced with in production of bananas include diseases such as Sigatoka & Fusarium wilt, shortage of clean planting materials, transportation to the market, post-harvest losses and accessibility to services by extension officers as well as access to agrochemicals. Most smallholder farmers chose banana varieties according to the availability of planting materials, productivity, and suitability to the region as well as market demand and their preferences are varied across the three counties. Adoption of tissue cultured banana cultivation was evidently low primarily due to limited knowledge of tissue culture technology.

Two field workshops have been held to disseminate the research findings to smallholder farmers the study site areas. In the first dissemination workshop finding on soil analysis of samples collected from the farmers’ farms was explained. Field demonstrations and training on identification, control and management of production constraints and postharvest losses were conducted in the farmers’ fields in the three counties. There were oral presentations and smallholder farmers were provided printed leaflets advising farmers the appropriate measures to be undertaken in order to improve the soil health.

The project is further supporting capacity building activities, two PhD students and one MSc student are currently being trained on designing appropriate interventions of increasing banana productions through cost effective tissue culture technology for micropropagation to produce high numbers of clean quality planting materials. A participatory approach is being adopted in this study which involves smallholder farmers, youth, researchers and collaborating institutions, This will enhance linkages between Kenyatta University and smallholder farmers.

Low cost banana micropropagation (L) Clean shoot culture (R) Pure contaminant isolate

Demonstration and training of smallholder farmers during the first dissemination workshop on soil analysis carried out using soil from farmers' fields, identification and management of common diseases of bananas identified during the research.
The magical fungi; working to increase maize yield in Kitui and Embu counties

Plants have developed a number of interaction mechanisms with microorganisms to enhance their acquisition of nutrients and water from the soil. A common mutualistic relationship is with the arbuscular mycorrhizal fungi (AMF). AMF have great potential to promote crop production and resilience under a changing climate. However, their function is affected by agronomic management practices, crop genotype and soil quality, among other factors.

The study seeks to determine Arbuscular mycorrhizal fungi (AMF) colonization potential of maize genotypes grown semiarid regions of Kenya, and assess AMF susceptibility of the maize genotypes. The colonization potential of maize genotypes grown in the arid areas of Embu and Kitui counties varied significantly between genotypes. Colonization of the root tissues results to sort of a bridge connecting the root with the surrounding soil microhabitats. This serves as an extended arms of the plant root system increasing the nutrient and water absorption of the plants. Maize variety known as (M3) had higher root AMF colonization than the other three maize varieties sampled; two open pollinated varieties from Kenya Agricultural and livestock Research institute (KALRO) and a hybrid variety from SC Company. Significant interaction between the maize varieties and farm soil characteristics were realized. The fungi’s colonization has significant influence on maize shoot dry weights and is greatly influenced by soil pH, calcium ions, soil organic matter and nitrogen. The study results demonstrate a strong effect of soil quality and crop genotype on AMF-symbiosis, which affects overall crop growth and production. These factors can be considered during the development of efficient low-cost inocula and maize breeding for enhanced smallholder farmers’ crop production.

The project is being sponsored by NRF, TWAS, and FLAIR Fellowship and Vice-Chancellor’s Research and Innovation Grant, KU and is being implemented by Dr. Ezekiel Mugendi, Prof. Steven Runo of the Department of Biochemistry, Microbiology and Biotechnology as well as Prof. Omwoyo Ombori, Mr. Morris Muthini of the Department of Plant Sciences and smallholder farmers in Embu and Kitui counties.

Right plant treated with mycorrhizal fungi @nurserymag.com

Arbuscular mycorrhizal fungi (AMF) spores and hyphae attached to the crop roots @nurserymag.com
Building programmes and policy evidence on what works to advance Women’s Economic empowerment

Kenyatta University received a grant from Bill & Melinda Gates Foundation through the Initiative on What Works for Women’s Economic Empowerment to establish a Women’s Economic Empowerment (KU-WEE) Hub. The overall goal of the Hub is to build program and Policy evidence on What Works to advance Women’s Economic Empowerment in Kenya to be utilised by stakeholders to shape policies, programs, interventions, and advocacy efforts. All research pieces will apply gender lens. Gender perspectives will inform all phases of the research process. Data collected will be disaggregated by sex and gender, and research questions will also focus on both inequalities and inequities between men and women in time use, distribution of unpaid and paid work, decision-making and leadership and how these differentially affect women and men. Overall, the findings should demonstrate how the identified constraints limit or facilitate changes in women’s economic empowerment and what works to remedy the situation.

So far, the Hub has established partnerships with diverse of international, regional, and national organizations, including KNBS, Tharaka Nithi County Government, Busara Centre for Behavioural Economics, and Institute of Economic Affairs. The partners are envisaged to form a link for piloting, testing, and implementing policy recommendations emerging from the Hub before scale up. They will also act as intermediaries for policy engagement with key decision-makers, providing policy statements for public education as well as discrete policy choices. They will also support research by providing pertinent statistical data and WEE statistics.

Kenyatta University Vice-Chancellor, Prof. Paul Wainaina and Tharaka Nithi Governor, H.E Muthomi Njuki during media briefing following a consultative meeting to discuss the partnership between KU-WEE Hub and the County government of Tharaka Nithi
The CS, Ministry of Public Service and Gender Prof. Margaret Kobia, cuts the ribbon during the officially launch the KU-WEE Hub. She is flanked by the KU Vice-Chancellor Prof. Paul Wainaina and the Hub Leader, Prof. Judith Waudo

The overall goal of the Hub is to build program and Policy evidence on What Works to advance Women’s Economic Empowerment in Kenya to be utilised by stakeholders to shape policies, programs, interventions, and advocacy efforts.

The Hub’s personnel and researchers’ capacity has also been enhanced courtesy of training sessions hosted by the Busara Center and Inclusive Yale. In regards to dissemination of findings, some teams have held webinars to share pilot reports with the different stakeholders. Similarly, a symposium was held titled COVID-19 and beyond: accelerating the use of evidence to maximize on opportunity to improve health and livelihoods of education and youth in Kenya.

So far, the Hub has established partnerships with diverse of international, regional, and national organizations, including KNBS, Tharaka Nithi County Government, Busara Centre for Behavioural Economics, and Institute of Economic Affairs. The partners are envisaged to form a link for piloting, testing, and implementing policy recommendations emerging from the Hub before scale up. They will also act as intermediaries for policy engagement with key decision-makers, providing policy statements for public education as well as discrete policy choices. They will also support research by providing pertinent statistical data and WEE statistics.
Konrad-Adenauer-Stiftung (KAS) Rule of Law Program for Sub-Saharan Africa and Kenyatta University School of Law under the lead of Prof. Tomasz Milej are in cooperation to realize a documentary film project on access to justice in Kenya. The project idea is based on the conviction that one of the main obstacles to implementing the Rule of Law and Human Rights in Sub-Saharan Africa is knowledge deficits on the part of citizens on what their rights are and how to access and attain justice.

To encourage and empower citizens to get actively involved and to pursue their rights, the KAS Rule of Law Program intends to produce a film featuring prominent Kenyan law cases that can serve as a positive example of how ordinary citizens and communities were -despite all challenges- willing and able to attain justice. The film seeks to attract a Kenyan and a region-wide audience it thus choose to focus on a legal topic that is of relevance which was Environmental Law.

Environmental justice claims and actions are widespread in sub-Saharan Africa. Extensive extractive sector activities have led to a dramatic transformation of landscapes and destruction of ecosystems, which is critical to rural livelihoods, and pollution of air and water, which is harming human health. Although many countries in the region recognize the right to a clean and healthy environment as enshrined in Article 24 of the African Charter on Human and Peoples Rights, strong incentives for private investment and powerful interests in extracting African resources continue to undermine these rights.

Kenya is among the countries that have adopted legally enforceable environmental protection in its Constitution. Furthermore, the existing laws provide the procedures, processes and structures that all State officers and organs, communities and individuals should follow to tackle negative environmental impacts. Citizens have been placed at the centre of environmental protection and governance by seeking their participation in environmental matters,
Some of the landmark environmental cases in Kenya include:

**Gibe III dam and Lake Turkana** case which demonstrates actions that communities can take to prevent future suffering from projects that can significantly harm their environmental and socio-economic rights.

The community organized itself under the umbrella of the Friends of Lake Turkana Trust to take precautionary measures against the consequent adverse effects of the dam. The community won the case where the court ordered the government to fully disclose all Gibe III dam ESIA information. The communities in the Lake Turkana basin continue to advocate for their rights following the dam's completion and whose effects are already live.
**Impacts of Dams Downstream**

- Reduced biodiversity; poor water quality; lower crop production; decreased fish population
- Dam
  - Blocked fish migration; disrupted flow of water and sediments
- Reservoir
  - Contributes to global warming; displaced communities; increased water borne diseases

LAPSSET project case - a landmark case in Kenya where the community in Lamu county got prohibitory orders and compensated Kshs. 1.7 billion (Euro 13.3 million). The Lamu community has severely suffered injustices, including the famous Lamu coal power plant project. Thus, the community has learned to organize itself under advocacy groups such as Save Lamu and civil society groups.

Production of a film on one or two landmark cases from the field of environmental law which has included interviews with citizens as well as legal experts and judges. The overall aim of the film is to tell the story of citizens who have successfully fought for their rights and promote them as positive role models and encouragement for communities/individuals facing comparably grave challenges, not limited to the field of environmental justice.

Furthermore, using the example of prominent court cases as mentioned above, the film will show some of the most critical steps which can inform and empower citizens to challenge environmental injustice. The 30-40 minutes film is set to be officially launched in the beginning of 2022.
A team of researchers from Kenyatta University, Laikipia University and Tom Mboya University College led by Prof. Grace Bunyi of Kenyatta University are in the third year of implementing a study titled: An assessment of the production of educational research and its utilization for policy formulation and programme implementation in Kenya under the National Research Fund multidisciplinary research programme.

One of the objectives of the study is to provide education researchers, graduate students and others interested in education research with a one-stop shop for education research literature. In pursuance of this objective, the team has set up an on-line education research database, the Kenya Education Research Database (KERD). The database indexed by Google Scholar contains over 1,500 publications from 2005 to 2020 and is hosted by the Kenyatta University Library.

The Research team has also developed an annotated bibliography of education research in Kenya. The bibliography consists of brief overviews of 100 articles selected from roughly 265 articles in KERD that are published in journals indexed by Scopus, Web of Science, Scimago, Directory of Open Access Journals (DOAJ) and African Online Journals (AJOL).

On Thursday 2nd September 2021, the Team held a virtual key stakeholders forum with the purpose of sharing achievements of the project; receiving feedback on gaps in what has been done; creating connections between research producers and users; and creating awareness about the project and especially about KERD in the education research community. Participants in the forum included researchers and policy makers in the Ministry of Education, Education SAGAs, public and private universities, research institutes/organisations, independent researchers and teacher training colleges.

Prof. Kabiru Kinyanjui, a renowned education research and mentor of many; and Dr. Sam Ngaruiya of the Ministry of Education, Directorate of Policy, Partnerships and East Africa Community Affairs made presentations entitled: Reflections on educational research in Kenya; and the use of research evidence in policy making in the Ministry of Education respectively.

Currently, the Team is engaged in field data collection with regard to education research production and its use to inform education policy formulation and practice.
Enhancing agri-business, livelihoods and environment through better management of major pests and diseases of horticultural crops in Eastern and Central Kenya

Horticulture sector accounts for over 12% of Kenya’s exports, with net income exceeding 1 billion USD annually. The sector employs over two million people directly and indirectly supports over 500,000. Vegetables constitute 36%, fruits 26% and flowers make up 30% of the sector. Export business is dominated by large scale firms, but majority of producers are small-scale. Pests and diseases are major constraints in horticulture. Farmer rely on expensive chemicals for pest and disease control, and this has led to unacceptable residue levels on produce. Growers face challenges in attaining certification to access premium markets and increased incidence of illness among growers due to pesticides has been reported.

A major problem in recent years is the emergence of pests and pathogen biotypes that are resistant to the common pesticides. The ENABLEHORT project was initiated with funding by NRF to conduct research challenges associated with use of chemical pesticides in horticulture.

The objectives are to assess pesticide use among small scale producers in Central and Eastern Kenya, support food safety and compliance with pesticide residue guidelines, assess diversity in pest biotypes affecting key horticultural crops, assess the relationship of pesticide use to health of grower communities and build capacity of growers, pesticide vendors and extension services on detection, diagnosis and responses to pests and pathogens. The research in its 3rd year of implementation has determined that pesticide use in horticulture is more in response to insect pests and less for control of diseases.
The key insect pests include fruit flies, whiteflies, thrips, aphids and cutworms. As an intervention the project tested and demonstrated effectiveness of pheromone traps in monitoring and control of fruit flies. Four types of pheromone traps were evaluated using mango and curucurbits as model crops, diverse fruit fly species were identified in farmers’ fields across the different study sites. To test genetic diversity as a factor in resistance to pesticides the project used early blight (EB) caused by Alternaria solani (a disease causing organism) on tomato as a model. To control early blight farmers rely on synthetic fungicides however, declining efficacy of fungicides has been a major concern. The study collected samples from tomato fields in 3 counties which were assessed with different pesticides. Results showed high sensitivity as well as high resistance to the different pesticides used. The genetic basis of resistance was determined to be associated to mutations in the organisms.

The findings from the study are helping to unearth the critical drivers to inappropriate pesticide use in Kenya’s horticulture sector, and will underpin the development of alternative integrated pest management measures. Project partners are Kenyatta University, Kenya Agricultural and Livestock Research Organization, Forum for Agricultural Advisory Services-Kenya, growers in Central and Eastern Kenya.
b) Partnerships and Collaborations

KU and Uppsala University team up to explore community-based approaches to conflict resolution

Collaborations between Universities are increasingly perceived as a vehicle to enhance innovations in internalization through knowledge exchange, research and other activities. The Uppsala University (UU) and Kenyatta University (KU) collaboration has resulted in the winning of a grant of 572,000 Kroner from the Swedish Research Council (SRC) spread over two years. The collaboration involves the Department of Peace and Research at UU and the School of Security Diplomacy and Peace Studies (KU). The collaboration will mainly involve conduction research and dissemination in the area of Community-based responses to violent conflict in Kenya in order to benefit policy makers in both Kenya and Sweden.

This is the first phase of the collaboration that will lead to writing of other grant proposals to benefit the two universities in the near future. The actualization of the MoU and implementation of the award will create two outputs namely academic publications and policy briefs, this enhance the standing of KU in global research output given that UU is the top most ranked university in Sweden. In addition, lecturers and students who are participating will build capacity in research, knowledge management and dissemination. So far one research workshop has taken place between the two universities. Additional the collaboration will promote staff and student exchange and capacity building among staff and students in areas such as grant proposal writing.

The project participants from KU include; Prof. Lucy Maina (Dean), Dr. Linnet Hamasi (Project Liaison), Dr. Leah Barasa, Dr. Benard Muiya, Dr. Xavier Ichani, Dr. Philip Wambua, Dr. James Nyawo and Hannah Muthoni. The Schools’ Ph.D students who will participate in the research include Joseph Karanja, George Oyombra and Fedinard Mumo Ngumbi. The grant participants from UU are; Prof. Kristine Höglund (PI), Dr.Emma Elfversson, Stefan Döring and Kathrin Maier (PhD Student).
In efforts to secure more collaborations, the Department of Educational Psychology has further partnered with the Center for Learning in Practice of the Carey Institute for Global Good (New York) under a collaboration theme titled: Promoting access to sustainable learning and professional development in the 21st century.

The collaboration seeks to jointly work towards the development of a competency-based framework for teacher professional development (PD) in refugee/displacement contexts that incorporates online teaching/learning, social and emotional learning (SEL), and other key proficiencies critical to holistic learning will be developed. The competency-based framework is expected to be responsive to the COVID-19 pandemic (and other crisis contexts), aligned with UNESCO’s Global Framework of Professional Teaching Standards.

The overarching goal for this initiative is to increase quality holistic learning outcomes, encompassing both academic and social and emotional learning (SEL), for children in displacement contexts.
Kenyatta University partnered with the Commonwealth of Learning (CoL) to explore the possibility of integrating Labster virtual simulations in the teaching and learning of practical subjects in the School of Pure and Applied Sciences (SPAS). Labster is an established company that specializes in development of interactive virtual labs for Science, Technology, Engineering and Mathematics (STEM) subjects.

COVID-19 has necessitated innovative and creative ways of delivering content as conventional face to face learning has been disrupted, negatively impacting the teaching of practical subjects that require demonstration of concepts, a difficult feat in the absence of face-to-face learning. Selection of the departments was entirely based on a quick overview of the simulations on Labster.com, with the pilot study commencing in mid-April 2021. Facilitators of each module/subject selected the most relevant simulations and these were uploaded within KU Learning Management System (LMS); Kusoma platform where students could access and interact with them at their own convenience. The cohort consisted of 131 students; attempting total 34 simulations distributed across 7 units.

Participants reported that simulations were user friendly, with all students rating the ease of use at above 80%. The participants indicated that the virtual labs stimulated curiosity to learn more because one could make mistakes while engaging with the simulations but the system allowed the students to repeat the tasks several times until they got the concept right. This was a source of motivation for the students since in real life scenarios; this is not the case in the physical lab activities.
Students’ reaction to the virtual labs;

‘These simulations not only reinforced the knowledge that I previously had, but also equipped me with some new knowledge, for example, 3D representations of organic compounds.’

Another student reported that;

‘The simulations were entertaining and guiding, I didn’t experience any challenge’.

As part of the recommendations on the use and improvement of the virtual lab simulations, the students and facilitators who participated suggested that, due to the diverse benefits associated with simulations in teaching and learning, the virtual labs be adopted and introduced as integral part of the core content to supplement the teaching-learning process.

Dr. George Onyango, the Dean Digital School is the Team Lead with Dr. Eric Masika as the Projector Coordinator and the programmes facilitators are; Prof. Micheal Gicheru, Dr. Ntabo Regina, Dr. Patroba Ojola, Dr. Margaret Ng’ang’a, Dr. Evans Changamu, Dr. Paul Muoria, Dr. Adelaide Mutune, Dr. Anne Maundu and Dr. Joshua Mutiso

Section of photos of students interacting with Labster virtual simulations in pre-selected simulations
Partnering to apply the principles of neuroscience to promote teaching and learning outcomes in the 21st century

Kenyatta University through the Department of Educational Psychology has entered into a Tripartite collaboration with The Institute for Connecting Neuroscience with Teaching and Learning (Seattle, USA) and The United States International University – Africa (USIU-A) to create a platform for utilizing Neural Education principles to enhance teaching and learning.

The collaboration between educators and neuroscientists has taken the form of an emerging discipline known as Neural Education. This developing field blends the collective specialties of neuroscience, psychology, cognitive science, and education to improve teaching methods and curricula. Understanding how neuroscience can inform education strategies and finding out what teachers want and need to know about the ways students learn are two key drivers behind the Neural Education initiative.

Many areas of neuroscience are already producing research findings that could provide ideas to improve teaching methods and curricula. Studies of memory formation and retrieval suggest testing is important for learning. The inclusion of the arts, particularly music, can enhance memory and attention levels. Also, multiple studies investigating the impact of sleep and exercise on young brains indicate the importance of these activities in brain development, function, and health. Integrating this research into classroom practice, however, requires meaningful dialogue between educators, scientists, and policymakers to adequately inform both research agendas and teaching practices.

In April members of faculty from both KU and USIU-A underwent a two-week immersive course, where the participants were taken through key topics that empower educators to help students learn and succeed. This was aimed at equipping all participants with skills to utilize the framework and foundation in evidence-based Neuroscience to reach out to students in a learner-centered way.

The Department of Educational Psychology is keen to forge a strong long-term partnership with the Institute for Connecting Neuroscience with Teaching and Learning (Seattle, USA) and the United States International University – Africa. The Department’s vision is to utilize this partnership to make Kenyatta University, which is the nerve-centre of Education in the region, the launchpad in Neural Education in Africa.

Prof. Jose-Phine N. Arasa
Acting Chair, Psychology Department, USIU-AFRICA

Prof. Kieran O’Mahony
PhD, BcID, FRGS
Founder and Board Chairman, (ICNTL)

Dr. David Kariuki
Chairman, Department of Educational Psychology, KU
Kenyatta University Laboratories at a Glance
Plant tissue culture lab is hosted in the Department of Plant Science. The facility provides research services and continuous capacity building to both local and international researchers. The main areas of focus include:

- **Low cost tissue culture** which involves regenerating plants using low cost chemicals and equipment
- **Plant microbe interactions** entails identification and determination of effectiveness of microorganisms in enhancing crop production and ability of the crops to withstand abiotic and biotic stresses
- **Population genetics** focuses on the processes that lead to genetic change, or evolution, in populations over time and space

The lab caters for students at all postgraduate levels as well as faculty members from various schools.
Thermocycler (Polymerase Chain Reaction)/PCR Machine – for DNA amplification

Autoclave - for sterilization of materials

Freezers for storage and preservation

Microscopic examinations of cells and micro-organisms

Thermocycler (Polymerase Chain Reaction)/PCR Machine – for DNA amplification
Food Chemistry Laboratory

Food Chemistry Laboratory is domicile in the Department of Food Nutrition and Dietetics which aims to improve the food, nutrition and health status of people through preventive and promotive activities and therapeutic nutrition care. The lab’s core functions include training and research for undergraduate and postgraduate students and staff. The lab personnel include well-trained technicians in food analysis, human body composition using stable isotope dilution techniques, anthropometry and biochemical analysis of nutrition status. Excellent training and research is made possible by having a well-equipped laboratory. Functioning equipment in place have made it possible for multiple successful projects being undertaken in the laboratory.

Types of analysis done (and that can be done) and equipment in the lab include;

- Food Proximate Analysis
- Elemental and heavy metal analysis
- Vitamins A, B series, E and Amino Acids Analysis
- Bio-electrical Impedance Analysis (BIA)
- Body Composition Analysis
- Determination of phosphorous

This lab serves the wider University community and is not a preserve of the Department of Food, Nutrition and Dietetics given its capacity and potential, the lab can also serve external researchers in areas of food analysis and nutrition related research.

IAEA funded national nutrition project; “KEN 6025: Enhancing the Use of Isotope Technique Applications to Assess the Effects of Nutrition Related Interventions- Tackling the Burden of Malnutrition and Obesity” is among the major projects that has brought along significant benefits for the lab which included valuable equipment.

All these are equipment available for research at the University and the Country.
Digital Atomic Weighing Scale

Atomic Absorption spectrophotometer

Agilent 4500 series portable FTIR spectrometer

Higher Performance Liquid Chromatography

Rotary Evaporator and Kjeldahl Protein Analyzer

Refrigerated Centrifuge
Prof. Vincent Onywera, Registrar RIO, 3rd right making a remark about the project and anthropometric equipment. Dr. Dorcus Mbithee (R) and Dr. Peter Chege 3rd (R) and the other research team members looking on.
The Plant Transformation Laboratory

The Plant Transformation Laboratory (PTL) is hosted as the flagship research facility in the Department of Biochemistry, Microbiology and Biotechnology. Researchers in the lab have had long-standing research experience in the basic understanding of interactions between crops and their environment. The researchers’ ultimate goal is to harness modern advances in plant science to improve crops and increase food production.

So far, the researchers have harnessed technologies of genetic engineering to produce drought tolerant maize and sorghum varieties. Other products developed using genetic engineering include low cyanide cassava, aflatoxin resistant maize, weed (Striga) resistant sorghum and pest resistant maize among others.

“We have continued to improve the genetic transformation technologies and use of genomics to understand interactions between crops and their environment. An important development has been using of gene-editing to introduce Striga resistance in sorghum.”

As a premier research lab in the region, they endeavor to train the next generation of plant scientists in the region with the aim of developing “homegrown” solutions for some of the most intricate constraints of food production in Africa.

Sylvia Mutinda (PhD student) admiring successful infection of parasites on roots of host crops in an experiment screening for resistance response of local crop varieties.
Asumpta (PhD student) showcasing her newly transformed cassava at the growth facility

Msc Students working on the laboratory benches

Set up for a screening experiment in the state of the art glasshouse facility
Kenyatta University secured an Infrastructural Support for Research and Training grant in 2018 from the National Research Fund (NRF) to establish the National Phytotherapeutics, Research, Upscaling and Quality Assurance Centre (NPRC). The Centre is mandated to develop a suitable habitat for further research and commercialization of research products and processes emanating from Kenyatta University and other learning and research institutions in the region.

To ensure that the center operates optimally, NPRC staff undergo continuous training on Quality Control techniques of herbal drugs. For sustainability, the NPRC is working towards bridging the gap between research and industry, as well as creating knowledge-based job opportunities through phytomedicines. The center addresses the priorities of the Big 4 Agenda by Promoting Universal Health Coverage through Manufacturing of Quality Herbal Medicine.

The center is currently undertaking analytical works include:

- Qualitative and quantitative determination of active ingredients in pesticide formulations
- Phytochemical screening of secondary metabolites in herbal products
- Nutritional, physical and functional properties of some grains
- Quantification of alkaloids in vegetable
- Identification of herbal products using macroscopic and microscopic techniques

The ongoing Upscaling and Processing Activities include:

- Processing of Prunus Africana powder, Stinging Nettle powder and Sorghum grain powder
- Extraction of Essential oil from Lemon grass and Eucalyptus
- Processing of Fixed oils from Canola seeds, Amaranth seeds, Chia seeds and Ground Nuts

The major Lab sections include the following:

- General Laboratory Area
- Quality Assurance section
- Microbiology section and
- Upscaling section

General Laboratory Area

The General laboratory area consists of a Dry Lab section and a Wet Lab section for the preparation of samples prior to instrumental analysis. The section is equipped with advanced laboratory equipment to support the key functions.
Quality Assurance section

The Quality Assurance section has requisite equipment for the identification and quantification of both primary and secondary metabolites in herbal materials; screening pesticides and natural toxins; analysis of essential oils and fragrances; determining the composition of both essential elements and toxic metals in plants, soil and liquids; characterizing chemical compounds from plants based on their ability to absorb UV and Visible radiation; and creating fingerprints of plant extracts as well as rapid determination of impurities in isolated plant compounds.

Microbiology section

The equipment at the Microbiology laboratory perform complex activities including enhancing visualization and documentation when performing microscopic characterization of herbal plants; microbial examination of herbal materials; personnel safety; maintaining aseptic techniques when handling samples; quantifying microorganisms; allowing the growth of microorganisms at the required temperatures; and sterilization of microbiological tools and media.

Upscaling section

The upscaling equipment at NPRC are semi-commercial and include an Essential Oil Distiller for extracting oils from herbs, an Oil Expeller for extracting fixed oils from seeds and nuts, and a Rotor Mill (SR 300) for grinding dry herbal materials into powder of different mesh.
The ongoing **Upscaling** and **processing** activities include:

1. **Processing of stinging nettle powder**
2. **Processing of Prunus africana powder**
3. **Processing of Sorghum grain powder**
4. **Essential oil from Lemon grass and Eucalyptus**
5. **Fixed oils from Canola seeds**
6. **Fixed oils from Chia seeds**
7. **Fixed oils from Groundnuts**
8. **Fixed oils from Amaranth seeds**
Some of the **core equipment** at the Centre include:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td><strong>Liquid Chromatograph Tandem Mass Spectrometer (LC-MS/MS)</strong></td>
<td>for detection, identification and quantification of both primary and secondary metabolites in herbal materials and screening of pesticides and natural toxins in plant materials</td>
</tr>
<tr>
<td><strong>Gas Chromatograph Mass Spectrometer (GC-MS)</strong></td>
<td>for analysis of essential oils and fragrances as well as other primary metabolites in herbal plants</td>
</tr>
<tr>
<td><strong>High Performance Thin Layer Chromatography (HPTLC) Densitometer</strong></td>
<td>that enables easy visualization of screened herbal extracts for the purposes of identification and quantification of their constituents</td>
</tr>
<tr>
<td><strong>Ultra Violet – Visible (UV-Vis) Spectrophotometer</strong></td>
<td>for characterizing chemical compounds from plants based on their ability to absorb UV and Visible radiation</td>
</tr>
<tr>
<td><strong>Fourier Transform Infra-Red (FTIR) Spectrophotometer with Attenuated Total Reflectance (ATR) technology</strong></td>
<td>for creating fingerprints of plant extracts as well as rapid determination of impurities in isolated plant compounds.</td>
</tr>
<tr>
<td><strong>Rotor Mill (SR 300)</strong></td>
<td>for grinding dry herbal materials into powder</td>
</tr>
<tr>
<td><strong>Oil Expeller</strong></td>
<td>for extracting fixed oils from seeds and nuts</td>
</tr>
<tr>
<td><strong>Essential Oil Distiller</strong></td>
<td>for extracting oils from herbs</td>
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3

INNOVATION NEWS
Loss of money due to bad debt is one of the biggest obstacles facing shops in Sub-Saharan Africa, forcing many to close down. This is due to poor record keeping done by pen and paper, complex accounting tools which the financial illiterate cannot use or afford, making it hard to track and recover every debt.

Kitabu Africa has developed ShopOkoa App, a mobile app that digitizes the entire shopkeeper lending process right from the point when a customer buys on credit up to the point when the shopkeeper collects the full amount of the debt owed by his or her customer.

ShopOkoa Mobile App is making it easy for Kenyans to borrow goods from shops especially during times of emergencies, and at the same time reducing the risk of defaulters for the Shopkeepers. This is the first mobile app in Kenya and the world to introduce Credit tokens and Credit limits to make shopkeeper lending a secure way for shops and SMEs to extend credit to their customers, this is a trillion-dollar opportunity that has been running on manual ledgers, not until the development of the ShopOkoa journey started during the cooperation between Neu-Ulm University and Kenyatta University funded by DAAD, that was being conducted by Chandaria Business Innovation and Incubation Center.

"Being an innovator at the Centre has helped me get mentorship, training and working spaces that have been essential in helping me see ShopOkoa Mobile App become a household name in sub-Saharan Africa".

The ShopOkoa App has been selected for various fellowship such as the leaders in Innovation fellowship UK London leading to a grant financing for commercialization worth Ksh 1.2 Million. Founded by Kelvin Muluma, the startup has also been interviewed by the fintech Innovation Lab London, an opportunity that might open doors for ShopOkoa App to launch in the UK.
According to a 2019 report by the Ministry of Energy, 71% of Kenyan households rely on solid biomass for cooking and heating while 14% of the total population use kerosene (a dirty fuel) for cooking. Annual charcoal consumption in 2019 was estimated to be Ksh. 68 billion (approximately USD 680 million). 92% of rural households use a type of woodstove as either their primary or secondary cookstove.

Jikopoa has been designed to use clean fuel sustainably with minimal emissions of carbon dioxide. Jikopoa technology is designed for use in rural and urban households, schools, hospitals and other institutions that have bulk usage of solid biomass on a daily basis. It uses sustainable briquette made from a vesicular extrusive igneous rock known as scoria.

The rock is plentiful in Meru region on the eastern slopes of Mt. Kenya. It has no carbon in its composition but when catalyzed, it has been seen to get ignited and does so for prolonged periods of time. It has also exhibited reusability property lasting several months before depletion.

Once adopted, Jikopoa will be expected to reduce deforestation and gender inequality, improve human health, create jobs and enable the government to use it as a measurement tool for sustainable access to energy for all. The startup owned by Lawrence Kaburu has been borne out of his research for his thesis study.

The founder is also a beneficiary of the Kenya National Innovation Agency innovators grant.
At Pyro-degrade Energy processes plastic waste into fuel, an affordable diesel alternative for stationery diesel powered engines. The startup has developed a technology to produce pyro-diesel from plastic waste. Pyro-diesel is an environmentally friendly diesel substitute – it is almost Sulphur free and has a low carbon footprint.

The startup has designed a processor which is self-sufficient – able to run off-grid powered by the fuel it produces. The efficient production process means that the supply of pyro-diesel at a lower cost than conventional diesel is feasible. Pyro-diesel is an environmentally friendly diesel substitute - it is almost Sulphur free and has a low carbon footprint.

The startup is also involved in construction of private processing plants for private organizations e.g. large scale farms. This would enable company produce its own diesel to power up their generators from their own plastic waste. Further pyro degrade energy does plastic waste distribution. The process involves buying plastic waste from pickers; sorting and grading it, cleaning, shredding and baling it for our personal use and selling the surplus to other consumers of plastic waste.

This startup owned by Brayan Mwangi and Aron Milla is changing the perception around plastic waste, as they view it as a resource. The duo recently won the Fahari innovation challenge by Kenya Airways under sustainability category.

According to the co-founders, Pyro degrade energy intends to repurpose up to 1000 tons of plastic waste in just the first year of operations. This would mean less plastic in the environment and more income for the plastic waste pickers.
RESEARCH DISSEMINATION AND UPTAKE
Examining the **shortfalls of Job application letters and curriculum vitae**

Supported by the Kenyatta University Vice-Chancellor’s Research Grant, a team of researchers carried out a study in response to numerous complaints from industry decrying the failure by job applicants to communicate effectively in job application letters (JALs) and curriculum vitae (CVs). The Principal Investigator, Dr. Phyllis Mwangi, worked with 5 other researchers namely Dr. Esther Mbithi, Dr. Adelheid Bwire, Dr. Purity Nthiga, Dr. Gatitu Kiguru and Dr. Caroline Mutwiri from: Literature, Linguistics and Foreign Languages; Education Communication Technology; as well as Library Science and Information. The researchers set out to examine whether the curricula and the syllabi, teaching materials, the actual teaching, and samples of CVs and JALs meet the expectations of industry.

Communication is a process that takes place in successive parts (moves), with each responding to a specific need or purpose. As far as teaching functional skills in the Kenyan education system is concerned, material developers, trainers, and learners are all guided by the curricula and syllabi. However, the findings of this study suggest discrepancies between the different players, leading to a weak link between the process; the product of teaching; and the expectations of industry.

Earlier discussions have clearly underscored the high regard with which industry holds communication skills in general including effective writing of the JALs and CVs. The industry players interviewed explained that these two documents are central to the shortlisting that leads to interviews in the hiring process. Analysis showed that whereas the sampled JALs and CVs had an identifiable generic structure, they had certain communicative weaknesses that need to be addressed. Specifically, applicants tend to talk about their work experience and personal attributes that do little to achieve the function of selling themselves. Most failed to articulate how their achievement and attribute fit the job being applied for.

There were varied responses from students about the teaching of the writing of JALs and CVs, with some saying they were taught and others saying they were not. However, the majority said they had been taught how to write these documents. It also emerged that most said the teaching could be made better in terms of feedback and use of current samples. Also noted was the fact that some of the respondents said that they use one CV with all applications and only a minority said they tailor the CV to each application. All sampled secondary school text books have covered the writing of JALs and CVs as dictated by the English syllabus. However, the authors of these textbooks have interpreted these functional skills differently and therefore the coverage is contradictory both in form and content.
Some of the study’s recommendation include among others;

• Secondary school syllabus to cover JALs and CVs in close association
• The need to strengthen the practicum or attachment feedback component as a way of enhancing the link between academia and industry.

• Writing centres to be established at tertiary institutions to foster functional writing skills.
• Students to take personal initiative to acquire and enhance functional writing skills;
• A nexus to be established between academia and industry where practitioners such as Human Resource Managers can be invited to apprise students of industry expectations on how to cogently sell oneself on the job market.

The project team during a dissemination workshop at KUCC
KU Researchers introduce a high yielding cooking banana hybrid (NARITAS)

There is an array of hope as Kenyan farmers prepare to plant improved cooking banana hybrids (NARITAs) that are not only high yielding and climate resilient but resistant to major diseases and pests. This has been facilitated through the Climate Smart Banana project (CLISMABAN) implemented by a consortium of researchers from Kenya, Uganda, Spain and Belgium. The project, which is in its third year of implementation is funded by the Long term EU-Africa research and innovation partnership on food and nutrition security and sustainable agriculture (LEAP-Agri) 2017.

The hybrids are the result of over 20 years of joint conventional breeding efforts between two CLISMABAN partners namely; the National Agricultural Research Organization (NARO)-Uganda; and the International Institute of Tropical Agriculture (IITA), hence the name NARITAs. The Kenyan team is involved in assessing the hybrids’ adoption potential by stakeholders within the value chains mainly farmers, consumers, and traders. Implemented in the Counties of Muranga, Kirinyaga and Embu.
Cognizant of the fact that end users of new scientific innovations are gendered, the team noted that a responsive adoption was critical. The project thus adopted a gender approach that targeted men and women within the value chains, taking all gender dynamics therein into consideration. The strategic exercise was to undertake a deliberate gender integrated mapping of stakeholders and sensitizing them of the project's mission.

Importation of 25 accessions of NARITA hybrids and 14 accessions of plantain hybrids (PITAs) all from The International Institute of Tropical Agriculture (IITA), Ibadan Nigeria were multiplied through tissue culture and established in the green house and research farm at KU. Simultaneously, the team embarked on sensitization workshops in the counties to create awareness about the new hybrids. This started at different levels of County administration, where leads to other gender integrated key players including farmers, consumers, agricultural extension officers, and traders and processors were provided. By doing so, their levels of involvement in the banana and plantain value chains was documented. Stakeholders in the value chains are involved in the whole project cycle, which is yet another unique aspect of the project.

Using a participatory varietal selection, gender-integrated farmers are currently working closely with the researchers to identify the most desirable varieties. Selection is based on agronomic performance at different stages of the plant life cycle. This has been achieved through regular visits by the stakeholders to the University, where they are taken through the whole research process and trained on good crop management practices, including identification and management of diseases and pests. Clear differences have been observed in the performance of the hybrids in terms of growth rate, length of life cycle and bunch size, among other traits.

Mary Mwangi, examining the NARITA hybrid in the screen house at KU

Farmers making presentation in a gender training session
To achieve gender responsiveness in banana/plantain farming systems. The team is offering in-depth gender training to integrated groups within the crops' value chains. A key component of the training is the gender dynamics that come with the introduction of new varieties of not just bananas/plantains, but also other crops.

The subsequent increase of wealth at the household mostly causes a gender shift as far as access to and control of resources is concerned. If not addressed, the shift dynamics often result in domestic violence, subsequently eroding all gains acquired in new technologies. In this respect, the project has engaged a Master of Arts Student to study and document a post-training analysis of the uptake and utilization of gender-specific knowledge for optimum gender responsive banana & plantain farming systems. Utilization of knowledge gained through training is hoped to improve the gender power dynamics in the household, which are critical to technology uptake.

In the next one and final year, the team plans to continue laboratory multiplications and greenhouse establishment to build a substantial germplasm bank at Kenyatta University. We also hope to incorporate two new varieties of sweet banana (Sukari Ndizi) resistant to Fusarium wilt and also continue greenhouse tests for both NARITAs and PITAs. The KU team anticipates that the combination of gender responsive farming systems and adoption of high yielding, climate resilient banana and plantain varieties will not only contribute to improved gender relations but also enhance household food security and income. Overall, this will contribute to sustainable agriculture and improved livelihoods.
Empowering parents for quality engagement in children’s reading: developing a needs based training guide

Dr. Gladwell Wambiri of the Department of Early Childhood and Special Needs Education together with her Co-Researchers: Dr. Mary N. Ndani and Dr. Esther N. Waithaka undertaking a project to empower parents for quality engagement in children’s reading.

One vital way in which parents can contribute to children’s early learning is by supporting children’s reading. Conflicting reports exist in regard to the benefits of parent involvement in children’s reading. Parent involvement in early reading is associated with early identification of reading problems making it possible to develop and implement interventions at the earliest opportunity. In some cases, parent involvement in children’s homework could also cause learners to have confusion of instructional techniques. Such negative effects arise when parents employ inappropriate strategies. It is important therefore to empower parents to be able to support children’s reading effectively.

The main goal of this study was to empower parents of children in Grade 1 to Grade 3 to support their children’s reading. The study was conducted in six schools in Kiambu County, Githunguri Sub-County. This is one of the counties in Kenya, where reading achievement levels have been relatively low.

The Researchers presenting class readers for Grade 1, 2 and 3 to enhance the school library box, one of the outcomes of the research
A significant proportion of parents embraced the training and became very enthusiastic in supporting their children’s reading. Other outcomes of this study include increased communication between parents and teachers using school diaries and a story-book merry-go-round initiative in which parents in a class buy one story book each.

Every two weeks, children exchange the story book and keep it for reading. This broadens children’s reading experience at a minimal cost. The researchers also donated three dozens of class readers to the schools that were used to start a school box library. Parents borrow these for use with their children. Teachers reported considerable active involvement of parents and increased interest in reading among children of the majority of the parents that went through the training. Significant improvement in reading rates and reading comprehension were recorded in schools where parents were trained compared to the control schools.

This study was conducted using funds from the Kenyatta University Vice-Chancellor’s Research Grant. The researchers are very grateful to the Vice-Chancellor for the grant and to the Division of Research and Innovation for their great support. They hope to scale up the parents’ training to other public primary schools if and when funds become available.
Assessing the power of sand dams in enhancing environmental management and Climate smart livelihoods

Utilization of water by a community member at one of the sand dam the sand dams © the water project
It is widely believed that Africa is a poor continent even by Africans themselves and for communities living in drought stricken areas this mindset is compounded by what they deem as hostile circumstances challenges such as unpredictable rainfall, food insecurity due to unreliable rainfall, lack of water for irrigation, livestock and household use among others have made communities in arid/semi-arid areas such as Machakos become desolate.

Sand dams have however brought an oasis of hope, Dr. Jane Mutinda of the Department of Environmental Studies and Community Development set out to investigate the impacts of sand dams in enhancing environmental management and climate smart livelihoods in Mwala Sub, Machakos County. The specific objectives of the project were: to assess the level of uptake and utilization of sand dams by rural households; to determine the impacts of sand dams in the management of the environment; and to determine the impact of sand dams in the enhancement of food production.

A sample population from 14 sites where sand dams had been constructed by the Machakos county government and other development partners were interviewed. From the results the researcher found out that the construction of sand dams had a positive impact on the respondents’ livelihoods, it helped in sand conservation which had a positive effect of raising the water table which resulted to residents’ increased access to water throughout the year.

The findings indicated that the construction of sand dams enhanced climate smart livelihoods and contributed positively to climate mitigation measures of the respondents 51% said that food security has improved while 49% were engaged in beekeeping, self-employment and bamboo farming. The study also established that sand dams have played a key role in enhancing water availability in the research area.
The School of Business held its 3rd International Business Research and Industrial Conference (IBRIC) virtually on 26th and 27th August, 2021. This was the second virtual conference to be held by the School and the third virtual event by the whole University. It is worth noting that the December 2020 conference held by the School was the first ever to be held by the University and it played a critical role in trailblazing the University’s transition to the virtual world; especially in teaching and graduation.

A total of 89 paper presentations were made with over 280 participants, drawn from academia and industry – local and international, attending the conference.

The conference brought together a broad spectrum of participants drawn from experts in the industry, policymakers, and researchers in academia to address the theme “Building Business Resilience and Sustainability in the Context of Economic Recession and Pandemics”. This theme was broken down into seven sub-themes, namely: Managing Global Human Resource and Knowledge; Technological Innovation and Financial Deepening; Strategic Resilience, Organizational Agility, and Industrial Responsiveness; Marketing Intelligence, Forensic and Cyber Security; Social Entrepreneurship, Supply Chain Management, and Sustainability; Project Management in Public and Private Sectors: Issues and Solutions; Corporate Challenges, Governance, and Performance. It is worth noting that this was the 2nd virtual conference held by the School.
The 3rd IBRIC 2021 Conference sought to provide an interdisciplinary platform for academicians, policymakers, top managers, researchers, practitioners and educators to present and discuss the most recent innovations, trends, and concerns, as well as practical challenges encountered and solutions adopted in the fields of Business Management and Innovation. The two-day virtual conference ultimately provided policy interventions to unresolved issues in the business world that keep emerging and make significant contributions to the Big-4 Agenda and Kenya’s Vision 2030 besides improving the ranking of Kenyatta University and School of Business in the local and international circle.

280 International and local participants, including policymakers, postgraduate students, Academia-Research, Policy Makers, industry players and researchers actively participated in the two-day virtual conference while 22,801 people followed the event on KUTV and Kenyatta University Social media platforms.

The virtual conference was officially opened by the Vice-Chancellor, Kenyatta University, Prof. Paul K. Wainaina. Ambassador Peter Kaberia, CBS, Principal Secretary, State Department for Industrialisation, delivered the Keynote address.

The conference sponsors were Kenversity Sacco, Anti Counterfeit Authority, Family Bank, Kenya Private Sector Alliance (KEPSA) and E Mobilis.
5

MOBILITY/ VISITNG SCHOLARS/ FELLOWSHIP
The Vice Chancellor leads a delegation for a remarkable visit to Spain

Prof. Paul K. Wainaina VC KU (2nd from left) together with team members at the University of Pompeu Fabra, Barcelona
A delegation of four (4) members from Kenyatta University led by the Vice-Chancellor Prof. Paul K. Wainaina visited Spain from 18th to 28th October 2021. Other members included Prof. Waceke Wanjohi (Deputy Vice-Chancellor Academic), Mr. Ken Monari Assistant Registrar (Directorate of Innovation Incubation and University Industry Linkages) and Dr. Esther Munyiri (Director, Global Tourism Resilience and Crisis Management Centre – Eastern Africa. This visit was within the framework of the European Exchange Programme, Erasmus+.

The team was hosted by the University of Girona and visited four other Universities, the United Nations World Tourism Organization (UNWTO) in Madrid Spain, the Ministry of Tourism in Spain and Placement International to create new collaborations and build on the existing ones.

Areas of partnerships initiated with the various institutions by the delegation included:

- Academic collaborations in students and staff Exchange Programmes.
- Credit Transfers for students.
- Building joint consortium of Universities
- Collaborative research
- Joint organization of summer schools
- Capacity Building initiatives
- Exchange of innovations and technology and policy and practice engagement with the industry, government and communities
Four postgraduate students from Kenyatta University, Department of Hospitality and Tourism Management are participating in a three-month Student exchange Programme in Spain from 19th September 2021 to 19th December 2021. This was made possible within a mobility scholarship in the framework of the European Union Exchange Programme, Erasmus+ KA1 International Credit Mobility Project.

The mobility aims at exploring an innovative and novel model where the students are expected to participate in academic and research activities as well as contribute immensely in international benchmarking on policy and practice.

While in Spain the students have visited The University of Girona, Andorra and The French Border of Spain.

KU students participate in an international benchmarking for research, policy and practice in Spain
Dr. Elijah Adongo returns from University of Florida, USA

Dr. Elijah Adongo a faculty member at the Department of Music and Dance at Kenyatta University received a scholarship to pursue his PhD studies at the University of Florida, USA in 2016.

The Scholarship was awarded by the University of Florida courtesy of the vibrant collaboration between the two universities (KU and UF).

While at the University of Florida, Dr. Adongo had a great experience which included leading music performances in celebrating a Kenyan Hero, the late Prof. Wangari Mathai, in a program organized by the Centre for African studies. He also led performances in celebrating the Martin Luther King Jnr Day in 2019. He took part in church performances, performed in the elderly care facilities, and high schools in Florida. Besides leading music performances, he enjoyed studying various aspects of music education, research in music education, and vocal performance. He is an accomplished vocalist and is currently working with the voice students and Kenyatta university choir in the Department of Music and Dance.

Dr. Adongo is currently working on various research projects on African choral music performance practices and social justice and diversity in music education. His PhD dissertation titled Pedagogical Strategies for Developing Musicians Understanding of Styles and Conceptual Knowledge of Contemporary African Choral Music, explored various ways in which music teachers can approach the teaching of African choral arrangements. The scholar explored ways of approaching choral dance choreography, choral instrumentation, and vocal pedagogy for African choral music.

Dr. Elijah Adongo returns from University of Florida, USA
KU Scholars visit University of Macerata, Italy

At University of Macerata, Italy. From Left to Right - Ms. Anne Mwiti, Mr. Adonijah Ombura, Dr. Beneah Shapaya, Prof. Flavia Stara (Italian TPAAE Coordinator), Prof. John Mugubi, Prof. Lorella Giannand
A team of four members of teaching staff from the School of Creative Arts, Film and Media Studies traveled to the University of Macerata (UNIMC), Italy from the 4th October 2021 to 5th December 2021 on the first secondment under the “Transcultural Perspectives in Art and Art Education” (TPAAE) project. The academic mobility is supported by the European Commission, Marie Sklodowska-Curie Actions Research and Innovation Staff Exchange, Horizon 2020 (MSCA-RISE H2020).

Representing the School, the four members of staff were:

1. **Prof. John Mugubi** - Dean and Associate Professor, Department of Communication, Media, Film and Theatre Studies;
2. **Mr. Adonijah Ombura** – Chairman, Department of Fine Art and Design;
3. **Dr. Beneah Azangalala Shapaya** - Communication, Media, Film and Theatre Studies;
4. **Ms. Anne Mwiti** - Department of Fine Art and Design.

The KU team visited and interacted with members of staff and students at the host institution, the University of Macerata. The members of staff taught classes and facilitated several workshops and symposia, presenting several academic papers. They also visited a number of Art galleries, Art Museums and Academies of Art and Universities teaching the Arts within the Cities of Macerata, Rome, Florence, L’Aquila, L'Aquila,
The Department of Educational Psychology continues to receive international students through a student exchange programme. The students pursuing different programmes are from the following countries Tanzania, France, Botswana, Ghana and Liberia. The Department is waiting for additional 14 students from Botswana. These students will be sponsored by Botswana's Ministry of Education to commence full time postgraduate studies during the current academic year.

From left to right: Dr. James Oluoch (Member, Departmental Linkages Committee, Mr. Moji Rampete (Postgraduate student from Botswana); Mr. Isaac GbadehJolokleh (Postgraduate student from Liberia); and Dr. David Kariuki (Chair, Educational Psychology Department).
“Thank you for the opportunity to attend a visiting fellowship (September-November 2021) at the African Studies Centre Leiden (ASCL). As a visiting fellow at the ASCL, I have had an enjoyable and intellectually stimulating time. I have also had the opportunity to interact with some colleagues and PhD students and exchanged ideas on their research and projects on Africa, sustainability and innovation. The fellowship has positioned Kenyatta University as a leading institution that promotes research in enhancing value chains, sustainability and inclusive development.

During the fellowship I have successfully:

1. Analysed Mean Squared Error (MSE) Data - Analyzed and disaggregated the MSE data with the guidance and consultation of Dr. Marleen Dekker. This interactive process has enabled me to critically look at data beyond the superficial representation and explore new concepts such as bricolage, demographic and MSE sustainability, social embeddedness and MSE sustainability among others.
2. Presented a Seminar – The blended seminar was organized by Dr. Andre Leliveld and was held on the 25th of October. I had an opportunity to present a seminar on the biodegradable packaging and sanitary towel project to ASCL faculty, invited guests students from other universities The presentation was on the Biodegradable packaging & Sanitary towels from Banana Pseudo stems and how to enhance inclusion in the project cycle.
3. Book donation – I received a donation of some books on Entrepreneurship and African Ecosystem for our students.
4. Created synergies with ASCL-The fellowship created an opportunity for 4 students from the Department of Fashion and Marketing to get training on Sustainable Development Goals (SDG) given by the director of ASCL between 22nd of November 2021 to 17th December 2021. This is a critical engagement on 2021 Small Private Online Course (SPOC): A Critical Engagement with Advancing the SDGs that is presented as a global classroom for 35 final year undergraduate and Masters students. Two 4th year students and 2 masters’ students were picked for this program and are currently in training.

I thank the University for the opportunity to attend this fellowship.”

Dr. Jacqueline Kisato
The Department of Mathematics and Actuarial Science was privileged to host Dr. Abraham Love Prins from Nelson Mandela University, South Africa for a research visit from 3rd to 12th December 2021. Dr. Love is a Senior Lecturer and researcher in the field of Pure Mathematics. His area of research is Character and Representation Theory. He is jointly supervising a Kenyatta University Phd student, David Mwanzia Musyoka, together with Dr. Lydia Njuguna.

During his visit, Dr. Love gave a series of Lectures titled: **On the Character Theory of Fischer-Clifford matrices** and motivational talks to undergraduate and Post-graduate students in Pure Mathematics.

He also paid courtesy calls to Dean SPAS, the Directorate of International Programs and collaborations and also the office of the Registrar RIO. The Department hopes to explore more ways of strengthening the collaboration which might eventually involve exchange programs and collaborative research between Kenyatta University and Nelson Mandela University.
The purpose of this award is to recognize, annually, in each Region of the IEEE, the Student member most responsible for an extraordinary accomplishment associated with Student Activities. The value of a student member who shows a pattern of dedication and ongoing service to a Student Branch/Student Branch Chapter is certainly recognized. The program is sponsored by the IEEE Member and Geographic Activities (MGA) Board.

Fidel Makatia of the School of Engineering and Technology was among the 9 awardees from the 10 regions awarded this year. Fidel was the awardee of region 8 which comprises of Europe, Asia, Middle East and Africa. The highly competitive award is given to one individual per region, sometimes the award is not given if the awarding committee is not satisfied with the nominees. The award consists of a customized award plaque, a digital certificate, and three years of complimentary membership in IEEE.

Fidel Makatia feted with the Larry K. Wilson regional student activities award

Mr. Fidel Makatia explaining how the Ventilator works, one of the project that led to his award
Winnie Ntinyari wins the African Plant Nutrition Scholar Award
The African Plant Nutrition Institute (APNI) recognizes and supports excellence in plant nutrition research in Africa through award of various funding schemes to scholars across different categories. The Scholars Award is conferred to deserving African graduate students whose studies are in sciences relevant to plant nutrition and the management of nutrients applied to crops. The awardees receive USD 2,000 to facilitate their research work.

Nitrogen (N) losses from farming have both economic and environmental implications. Farmers spend a significant amount of money on nitrogen-based fertilizers with every planting season. Unfortunately, not all the fertilizer ends up in the plants. Reports have indicated that only about half of the applied nitrogen fertilizer was utilized by growing crops. The rest was potentially lost to the environment via several pathways, including leaching, runoff, volatilization, among others. The amount of loss also varies among farms and crops due to the influence of soil, weather, and, most importantly, management practices.

Ms. Ntinyari’s research estimates and models nitrogen budgets that analyzes nitrogen fertilizer management scenarios for improved nitrogen use efficiency, quantifies nitrate leaching and nitrous oxide emissions in maize-rice cropping systems as major nitrogen loss fluxes influenced by fertilizer application. Nitrogen budgets will be essential in informing decision and policy makers on the need to shift focus towards the management of this essential nutrient. The nitrogen budget will also be modeled to provide projections of the future state of nitrogen use in farms and how it will impact crop productivity and food security. The best-case scenario for nitrogen fertilizer management will be put forward as a recommendation for farmers to improve nitrogen use efficiency in their farms, understanding the complete nitrogen cycle in agriculture system and achieving high crop yields.

“My current research interests are to develop rational nutrient management scenarios for Africa through the development of nitrogen budgets at different spatial scales to guide farmers’ practices. My future care er goals are to work in a competitive research environment at both local and international levels to contribute to improved and sustainable strategies for crop nutrient management and mitigation of greenhouse gases in agriculture. I hope to work with small-scale farmers in rural areas and equip them with technologies to prevent nutrient loss and maximize crop production. I also plan to join a professional body for networking and enhancing my scientific skill and open up future opportunities”.

Ms. Winnie Ntinyari
Department of Agricultural Science and Technology

Supervisor

Dr. Joseph Gweyi,
Kenyatta University and Dr. Cargele Masso, International Institute of Tropical Agriculture, Cameroon
Joel Masanga; A promising upcoming Plant Physiologist

Joel whose non-scientific interest are classical music and community work specifically tree planting is interested in using advances in plant sciences to improve crop production and preserve biodiversity. Joel started his research career in 2013, as a research assistant to Dr. Amos Alakonya at the Institute of Biotechnology Research, Jomo Kenyatta University of Agriculture and Technology. At the Institute he worked on optimizing protocols for genetic transformation of maize and groundnuts – protocols which he later used as a graduate student to produce transgenic for resistance against aflatoxins. Upon finishing completion of his master’s degree, Joel went on to contribute to various crop genetic improvement projects in Kenya and overseas; such as control of cassava brown streak virus, management of Striga and maize lethal necrosis disease.

Joel says “A highlight of my training was in 2017 when I had the opportunity to visit Prof. David Baulcombe’s lab, at the department of Plant Sciences, University of Cambridge, where I worked on a project aimed at engineering maize for resistance against maize lethal necrosis disease using microRNAs. Currently, my focus is on managing noxious parasitic weeds (Striga and dodder). Using funding from International Foundation for Science and National Research Fund-Kenya, I have been able to generate knowledge on approaches to control these weeds in Kenya. In future, I hope to apply my genomics and geographical information knowledge and skills to bring tangible solutions to these weed-choked lands”.

The dodder appears as a yellow canopy, hanging over trees, bushes, live fences and has potential of encroaching on economically valuable crop © CABI
KU students exploring research in space science to guide agricultural use and disaster management.

The Dean School of Engineering Dr. Shadrack Mambo Centre holding the award given to the KU team for the 2nd runners up position.
Kenya space Agency (KSA) in 2020 placed call for proposal on nanosatellite development project to construct nanosatellite for imagery, telemetry and UAV guidance for agricultural use and disaster management. Several universities responded to the call and five were awarded Kenya shillings one million each to develop their nanosatellite. Kenyatta University was represented by a group of students lead by Mr. Fidel Makatia from the School of Engineering and Technology. The students working under the mentorship of Dr. Shadrack Mambo and Dr. Victor Mwongera were able to develop a prototype of which a test and demonstration event for the teams was organized on 14th October, 2021 by KSA. Kenyatta University scooped the 2nd Runners up Prize. The University was part of the consortium of the four universities that where selected to proceed to the next phase of the project which KSA will fund to the tune of three million shillings (3,000,000).
Prof. Omwoyo Omboro (Third Left) and his project team handing over improved banana seedlings to farmers.