



MACHAKOS UNIVERSITY

Soaring Heights in Transforming Industry and Economy

BIANNUAL RESEARCH AND INNOVATION BULLETIN



FUNDAMENTAL STATEMENTS

Our Vision

A preferred University of Excellence in Scholarship and Service Delivery

Our Mission

Provide scholarly education through Training, Research and Innovation for Industrial and socio-economic transformation of our communities

Our Identity

Machakos University is an academic institution committed in transmitting knowledge, skills and attitude through science, Technology and Innovation for the benefit of humanity

Our Philosophy

The Philosophy of Machakos University is to provide transformative leadership in Teaching, Training, Research, Innovation, Industrial and Technology transfer for wealth creation

Core Values

Integrity
Accountability
Professionalism
Inclusivity
Creativity
Teamwork
Equity



INSIDE THIS ISSUE



Machakos University hosts 5th International Conference

3



Embracing Technology and Innovation: Machakos University 5th Innovation and Exhibition Week

5



Ajiry Center launch

8



Machakos University Shines at South Eastern Kenya National Show

10



Huawei ICT Competition Global Finals 2023

12



Growing Together: Tree Planting for a Sustainable Future

13



Empowering Staff through Trainings

15

EDITORIAL MESSAGE



The mission of Machakos University is to provide Scholarly Education through Training, Research and Innovation for Industrial and Socio-Economic Transformation of our Communities. The division of Research, Innovation and Linkages coordinates the University's drive towards excellence in research, innovation and technology transfer. Some of the major activities carried out annually to grow research and innovation include capacity building of staff through regular training on writing grant winning proposals and training on innovation, patenting and commercialization. The University through the division of research annually organizes innovation and exhibitions events

where the best innovations from students, staff and other stakeholders are awarded. A number of Machakos University innovations which were identified during the innovations event have been earmarked for protection, patenting and commercialization. It is through the innovations and exhibitions *events that some of the innovations that have been commercialized such as i-voting were identified. To achieve its mandate of community outreach, the university among others participates in the annual South Eastern Kenya National show with a view to transfer university bred technology to the community. The exhibits are either in Science, Engineering, Agriculture, Environment and Information Technology among many others. The university has annually been organizing international conferences to enable researchers disseminate their research findings to the public. The 7th Biannual research and innovation bulletin is the forum through which the university communicates pertinent news on research, innovation and best practices enhanced by university students and staff, how the experience of conducting research benefits the University staff, students, and the wider community. The items featured in the bulletin are just a few of the research and innovation activities which were organized in the year

Prof. David Mulwa, Ph.D.
Ag. Registrar (Research Innovation and Linkages) &
Chairman, Editorial Board

Editorial Team

Prof. David Mulwa	- Chairman, Ag. Registrar (RIL)
Ms. Nancy Ingoshe	- Administrative Assistant, Office of the Registrar RIL
Ms. Linet Messo	- Senior Administrative Assistant, Office of DVC-RIL
Mr. Moses Marwa	- ICT Department

FROM THE DEPUTY VICE-CHANCELLOR (RESEARCH, INNOVATION AND LINKAGES)



**Prof. Peter N. Mwita, PhD,
Deputy Vice Chancellor,
Research, Innovation and
Linkages**

The Division of Research, Innovation and Linkages was established in 2018. Since then, the University through this division has undertaken many initiatives to enhance research, innovation and technology transfer with a view to solve problems within the community and support the governments vision 2030, the Kenya Kwanza government bottom up agenda, the global strategic development goals among other many development agenda. The division has facilitated the development of the necessary policies to support research, innovation and technology transfer. The university has also established partnerships with the academia, industry and international organizations through signing of memoranda of understanding/agreements with a view to strengthen its collaboration in research, innovation, technology transfer and community outreach.

The University, through the division of research has a calendar of annual events which are included in the university wide almanac. Some of these annual events include the Machakos University International Conference, the Innovation and Exhibition week, the South Eastern National Show and the Annual Machakos University Community Outreach week. Besides these, the university has aggressively built the capacity of staff and students through regular training on research proposal writing, innovation clinics and support to students' innovation clubs. The university has supported staff members' applications for external research grants and also set an annual internal research kitty through which academic staff competitively apply to carry out research and report their findings in different fora. Out of these efforts, the university has realized some major milestones in research and infrastructural developments such as the establishment of the Luban Workshop which was equipped through a partnership with Tianjin City Vocational College, the only one of its kind in the Eastern African region and also the appointment to the UNESCO chair on Cloud computing among many others. In this 7th Biannual research and innovation bulletin, the university disseminates information on some of the research and innovation activities that were undertaken within the year by the Staff, Students and partners of Machakos University. This 7th Bulletin on Research and Innovation highlights the aforementioned activities.

MACHAKOS UNIVERSITY HOSTS THE 5TH INTERNATIONAL CONFERENCE

The Machakos University 5th International Conference held from Wednesday 14th June 2023 to Friday 16th June 2023 was a resounding success, attracting participants from around the globe. Under the theme of "Leveraging Research, Innovation and Technology for Socioeconomic Development," the conference provided a platform for researchers, academics, industry professionals, and policymakers to come together and discuss pressing issues related to sustainable development. The opening ceremony of the conference was graced by Dr. David Watene, the Deputy Director of University Education and Research from the Ministry of Education. His presence highlighted the significance of the event and showcased the government's commitment to supporting research and development initiatives. The closing ceremony was presided over by Prof. Dickson Andala, the Chief Executive Officer of the National Research Fund (NRF), further emphasizing the conference's importance in the academic and research landscape.

The conference received an overwhelming response, with a total of 136 abstracts submitted across seven sub-themes. These sub-themes were carefully selected to address key areas crucial for socioeconomic development. The conference featured 86 paper presentations, where researchers and experts shared

their findings, insights, and innovative ideas to drive progress in various fields. A remarkable achievement of the conference was the physical participation of 198 attendees.

The presence of such a diverse group of individuals, including professionals, researchers, and students, contributed to the richness of discussions and the exchange of knowledge. The conference successfully showcased the prowess of Machakos University in organizing and hosting an international event of this magnitude. The university's management, research division, and students and faculty deserve accolades for their dedication and hard work in bringing together such an esteemed gathering. Their efforts exemplify the commitment to fostering research, innovation, and technology for the socioeconomic advancement of not only the university but also the broader community.

The chosen theme, "Leveraging Research, Innovation, and Technology for Socioeconomic Development," holds great significance in the current global context. Research and innovation are fundamental drivers of progress and play a crucial role in addressing the complex challenges faced by societies worldwide. By leveraging the power of technology, new knowledge, and innovative approaches, we can drive positive change and achieve sustainable development goals.



The sub-themes of the conference reflected the diverse areas critical for socioeconomic development.

1. Sustainable Agriculture and Food Security: Discussions centered on finding sustainable solutions to enhance agricultural practices, promote food security, and address the challenges faced by the agriculture sector.
2. The Built Environment and Infrastructure Development: This sub-theme explored ways to create sustainable and resilient infrastructure systems, urban planning, and sustainable building practices for long-term development.
3. Climate Change, Environment, Health, and Tourism: Emphasizing the interconnections between climate change, environmental preservation, public health, and the tourism industry, this sub-theme aimed to identify innovative strategies for a sustainable future.
4. Education and Knowledge Management for Sustainable Development: Discussions focused on the role of education and knowledge management in fostering sustainable development, promoting lifelong learning, and empowering individuals and communities.
5. Energy, Manufacturing, and Industrialization: This sub-theme delved into energy generation, manufacturing processes, and industrialization strategies that prioritize sustainability, efficiency, and responsible resource management.
6. Science, Technology, Engineering, Arts, and Mathematics for Development: Recognizing the importance of STEAM disciplines, this sub-theme explored the role of interdisciplinary approaches in driving socioeconomic development and fostering innovation.



The Machakos University 5th International Conference provided a platform for researchers, scholars, and industry experts to share their knowledge, collaborate, and forge partnerships for sustainable development. The conference underscored the value of research, innovation, and technology as catalysts for positive change, highlighting their critical role in addressing socioeconomic challenges on a global scale. The link to the 5th Conference proceedings is <https://www.mksu.ac.ke/wp-content/uploads/2023/10/BOOK-OF-PROCEEDINGS-5TH-CONFERENCE.pdf>

MACHAKOS UNIVERSITY 5TH INNOVATION AND EXHIBITION WEEK

Celebrating Innovation and Technology: Highlights of the Innovation and Exhibition Week at Machakos University

The 5th Innovation and Exhibition Week at Machakos University took place on 24th-25th May 2023, at the University Sports Ground. The event brought together distinguished guests, innovators, exhibitors, and students from various institutions. Under the theme "Innovation and Technology for Socioeconomic Development," the event celebrated the pivotal role of innovation and technology in driving sustainable growth and progress. The event witnessed the presence of several notable individuals who contributed to its success.



Underscoring the significance of Innovation and Technology, the Chief Guest, Hon. Sharon Mutua-CECM (Trade, Industry, Tourism and Innovation), Machakos County, highlighted that innovation and technology are fundamental to every aspect of the nation's progress. In an era of rapid change and intense competition, innovation and technology ensure the relevance and success of businesses, institutions, and organizations. Innovation and technology empower societies to overcome challenges and pave the way for a brighter future. Celebrating the Power of Innovation and Technology: Prof. Joyce J. Agalo, the then acting Vice-Chancellor, expressed her delight and gratitude towards the attendees and emphasized the importance of innovation and technology for societal development.





The Innovation and Exhibition Week featured an impressive array of innovations and exhibits that demonstrated the creativity and brilliance of the participants. These notable creations included:

1. Table Banking Management (Chama) System
2. E-mess
3. Shambagrow
4. Intelligent Camera for the Visually Impaired
5. Metaverse Safaris
6. G2F Connect

7. Solar Operated Mopping Machine
8. Smart Parking Management System
9. Automatic Power Regulator
10. Self-Powered Kettle
11. Satellite Aided Speed Control
12. T-Scholler
13. Eco-Shoes/Sneakers
14. Robo Farm & Noise Control
15. Digital Consumer Involvement
16. MksU Students App
17. Pharmacy Management System
18. Rental Website Creation



Prof. Peter Mwita, the Deputy Vice-Chancellor in charge of Research, Innovations and Linkages, emphasized the need to foster an environment that supports the practical implementation of innovations. He said that the University aims at providing a platform for innovators to connect, interact, and freely exchange ideas. The Innovation and Exhibition Week serves as a catalyst for collaborative efforts, enabling participants to showcase their inventions and contribute to the betterment of society. The event highlighted the importance of embracing innovation and technology in our rapidly evolving world. The remarkable innovations and exhibits showcased during the event demonstrated the university's commitment to nurturing creativity and providing a platform for innovative ideas. attendees were inspired by the spirit of innovation and technology, fostering hope for a brighter future filled with groundbreaking solutions that can positively impact society.

AJIRY CENTER LAUNCHED AT MACHAKOS UNIVERSITY

Machakos University witnessed a momentous occasion as the Ajiry Centre was inaugurated on 28th April 2023. The Ajiry Centre, an employment bureau aimed at providing vital support to students and graduates in their pursuit of meaningful employment, was met with great enthusiasm and excitement. The ceremony, held on the university campus, brought together esteemed guests, university officials, and key leaders of the Ajiry Initiative.

The inauguration was graced by prominent individuals, including the Chancellor of Machakos University, Dr. James Mworio. Mrs. Mercy Wanjau- the Secretary to the Cabinet, Dr. Fredrick Ndambuki- Representative to the CS, Education, Mr. Brian Mwau- Ajiry Lead Developer, Tribus TSG, Mr. Kenneth Mbae- MD, Centum Real Estate, Simon Mwangi- Head of Institutional Banking, Sidian Bank, Mr. Simba Simon Mwako- Chief Officer, Education

-Machakos County Government, Mr. Douglas Mwangi-Deputy CEO, Sidian Bank and Mr. Peter Gachuba-Commissioner for Revenue Allocation. Also in attendance was the Chairman of Council of Machakos University, Dr. Christopher G. Gakahu, who emphasized the importance of this initiative in bridging the gap between academia and industry.

The key leaders of the Ajiry Initiative were acknowledged for their dedication and hard work in bringing the project to fruition. James Nicholl, the Managing Director of Tribus – TSG, played a pivotal role in the development of the initiative, while Brian Mwau, the Ajiry Lead Developer, showcased his expertise in creating a platform that connects students and graduates with potential employers.



The ceremony also recognized the support provided by the Mastercard Foundation, who has been instrumental in financing the Ajiry Centre and its programs. Their commitment to empowering the youth in Kenya has been commendable and deeply appreciated.

During the inauguration, the importance of Ajiry as an employment bureau was highlighted. It was emphasized that Ajiry serves as a bridge between the university and industry partners, working collaboratively to identify job opportunities and connect students and graduates with potential employers. By offering services such as job search support, career counseling, and networking opportunities, Ajiry aims to enhance employment prospects and enable students and graduates to gain valuable skills and experience.

Speaking during the occasion the Vice Chancellor, Prof. Joyce Agalo stated that "As a university, we recognize the importance of employment in society and the critical role that the university plays in preparing students for the workforce." She observed that with its potential to reduce unemployment rates, contribute to economic growth, and cultivate a skilled workforce, Ajiry is poised to shape a better future for graduates and the entire nation. She noted that by establishing fruitful partnerships between academia and industry, Ajiry seeks to drive sustainable development and create a brighter future for the Kenyan economy.

The ceremony concluded with an encouraging call-to-action. Students, graduates, and the community at large were urged to take full advantage of the services offered by Ajiry and actively participate in their own career development. Employers were also encouraged to collaborate with Ajiry, providing opportunities for the university's talented graduates. This synergy between academia, industry, and students will pave the way for a prosperous future, benefiting both individuals and the nation as a whole. The inauguration of the Ajiry Centre marks a significant milestone in the journey towards empowering the future workforce. Machakos University and its partners remain dedicated to nurturing talent, fostering growth, and building a resilient nation that thrives on the strength of its skilled workforce.

MACHAKOS UNIVERSITY SHINES AT SOUTH EASTERN KENYA NATIONAL SHOW, SHOWCASING SUSTAINABLE INNOVATIONS AND TECHNOLOGICAL EXCELLENCE"



Machakos University (MksU) took part in the Machakos South Eastern Kenya National Show, whose theme was ***"Promoting Climate Smart Agriculture and Trade Initiatives for Sustainable Economic Growth."*** The university demonstrated her commitment to sustainable practices and technological advancements by registering to compete in six different categories at the show. MksU achieved remarkable success, securing top positions in three categories and showcasing her expertise in various fields. The University emerged top in: Stand that Interprets the Current Show Theme Award, Best University Stand Award and Best Innovation and Invention Stand Award while scoping the second position in; Stand that Demonstrates the Application of Environmental Quality, Best Stand in Hospitality and Catering Services Award and Best Stand Embracing IT and Communication Award. The University's notable achievements in interpreting the show theme, innovation and invention, and the overall university stand position, along with her commendable placements in environmental quality, hospitality, and IT and communication categories, exemplify her excellence and commitment to sustainable economic growth. By excelling in various categories and demonstrating a comprehensive understanding of the show's theme, MksU reinforced her dedication to promoting climate-smart agriculture, technological advancements, and sustainable practices.



MACHAKOS UNIVERSITY EMERGES VICTORIOUS AT HUAWEI ICT COMPETITION GLOBAL FINALS 2023.

The Huawei ICT Competition Global Finals 2023 was held in Shenzhen, China, from 24th to 27th May 2023. The competition brought together talented students from universities around the world who showcased their skills and knowledge in the field of Information and Communications Technology (ICT). The competition which was categorized into Network Track, Cloud Track and Artificial Intelligence (AI) Track aimed at fostering ICT talent development globally and bridging the digital divide by nurturing the next generation of technology professionals. By creating a platform for students to demonstrate their expertise, Huawei aims to encourage innovation, collaboration, and the exchange of ideas among young minds created a platform for students to demonstrate their expertise.

The competition encompassed multiple stages which included local and regional rounds, culminating to the Global Finals. The Huawei ICT Competition 2022-2023 commenced in September, 2022 with an impressive participation of thirty-six (36) universities in our country. Machakos University presented eleven (11) students who participated at the National level in the network track. Additionally, two students, Humphrey Mwambaji and Martin Mwenda Mwititi, along with seven (7) students from the University of Nairobi, Jomo Kenyatta University of Agriculture & Technology, Cooperative University, and Laikipia University, excelled and qualified to represent Kenya in the Sub-

Saharan Regional Finals held in South Africa.

Kenya Team One (1), led by Humphrey Mwambaji from Machakos University, secured the First prize in the Network Category and was rewarded for their achievements. His qualification for the Global Finals showcased outstanding capabilities and positioned him as a representative of Kenya on the international stage. His success highlights the quality of education and training provided by Machakos University and the other participating universities in the country. It is worth mentioning that Machakos University has always been a force to reckon with in this era of innovations and technology. Notably, the university has a long history of technological achievements, starting from the I-Voting discovery made by Kelvin Kuria, an ICT guru and student of the university. Kelvin invented a seamless voting platform that was utilized by Kenya's voting body, the Independent Electoral and Boundaries Commission, in transmitting the last election to the tallying center at Bomas of Kenya. These accomplishments underscore the ICT expertise embedded in the students of Machakos University.

The prizes awarded included medals, scholarships, internship opportunities, and access to Huawei's ICT infrastructure and resources. We congratulate the competitors from Machakos University for their remarkable achievements and commend their dedication and expertise in the ICT field



GROWING TOGETHER: TREE PLANTING FOR A SUSTAINABLE FUTURE

Tree planting event is one the Machakos University's long-standing tradition of promoting sustainability and environmental awareness. The University recognizes the importance of preserving the planet and inspiring others to join in this cause. Tree planting serves as a tangible and proactive approach to addressing environmental concerns and creating a sustainable future. The tree planting event, which took place on April 27th, 2023, was a resounding success, engaging 2022 graduates, faculty, and staff in an impactful environmental initiative. The event, organized by the Division of Research, Innovation and Linkages aimed to promote sustainability, raise awareness about environmental issues, and enhance the beauty of the university campus through tree planting. The graduates were

involved in order to fostering a sense of environmental responsibility among them. The tree planting event commenced with Participants being welcomed by the Deputy Vice-Chancellor (RIL) Prof. Peter Mwitwa, who provided an overview of the event's objectives and the importance of tree planting in environmental conservation. During her speech, the Ag. Vice Chancellor Prof. Joyce Agalo emphasized the importance of sustainability and environmental stewardship, further reinforcing the significance of the event. A careful selection of native tree species suitable for the local climate and soil conditions was made to ensure the long-term viability and growth of the trees. Species such as [tree species names] were chosen for their adaptability and ecological benefits.

During the event, a variety of trees native to the region were planted. The selection of trees was significant as it ensured that the newly planted vegetation is well-suited to the local ecosystem. These trees serve multiple purposes beyond beautifying the university campus as they also contribute to improving air quality by absorbing carbon dioxide and releasing oxygen, thus mitigating the impact of greenhouse gases. Additionally, they help reduce soil erosion by stabilizing the soil with their roots, preventing runoff and maintaining the integrity of the land. Furthermore, the newly planted trees will create habitats for wildlife,

enhancing biodiversity within the University. The event provided a platform for participants to network and engage in discussions about sustainability, fostering an environment of shared learning and collaboration. The tree planting event was a fulfilling and educational experience that united the university in a collective effort to make a positive environmental impact. Through this event, participants were not only able to contribute to a greener campus but also gained valuable knowledge about the significance of tree planting and environmental stewardship.





EMPOWERING STAFF THROUGH TRAININGS

TRAINING ON GRANT PROPOSAL WRITING AND SOURCING OF FUNDS

The university in its endless pursuit to build capacity of researchers, conducted a training on grant proposal writing and sourcing for external funding. The training which was conducted by Executive Director African Institute for Capacity Development (AICAD), Prof. Dominic Byarubaga and Chief Executive officer, Beeline Research Ltd, Mr. Joseph Njogu, was held on 16th February, 2023 and attracted over sixty researchers from all disciplines.

The participants were taken through steps in which they can write award winning proposals while sourcing for funds. They were also enlightened on key areas to capture when writing proposals. The interactive session ended with a practical session where participants contributed towards writing a proposal and presenting it to the financial body. Well! Let's wait for the outcome.

ROLE OF NACOSTI, NRF AND KENIA

Machakos University, through the Directorate of Research Innovation and Technology Transfer organized a one-day Seminar on the roles of National Commission for Science, Technology and Innovation (NACOSTI), National Research Fund (NRF) and the Kenya National Innovation Agency (KeNIA). The training which was conducted on 10th May, 2023 was officially opened by the Deputy Vice-Chancellor (Research, Innovation and Linkages) Prof. Peter Mwita. In his remarks Prof. Mwita emphasized the importance of research and its critical role in driving socioeconomic progress and sustainable development of the country and society in general. He urged the participants to engage the facilitators for better comprehension on the various roles institutions that are established to guide the conduct of research in the country played. He also challenged the participants to state emerging challenges facing the research process and how these institutions address these challenges. The facilitator, Dr. David Ngigi from NRF, took the participants through the roles, functions and mandate of NACOSTI, NRF and KeNIA.