UNIVERSITY OF DAR ES SALAAM

11TH Research and Innovation Week-2026

Theme:

Harnessing Tanzania's Mineral Wealth for Renewable Energy, Digital Transformation and Societal Security

BOOK ABSTRACTS

JUNE 2026

UNIVERSITY OF DAR ES SALAAM

11th Research and Innovation Week-2026

Theme: ***Harnessing Tanzania's Mineral Wealth for Renewable Energy, Digital Transformation and Societal Security***

Book of Abstracts

June 2026

Research and Innovation Projects exhibited at the University Level Research and Innovation Week held from 9th - 11th June 2026 at the University Library, University of Dar es Salaam

PREAMBLE

This Book of Abstracts presents a comprehensive collection of research and innovation projects undertaken by staff and students of the University of Dar es Salaam (UDSM) and showcased during the 11th UDSM Research and Innovation Week (RIW) 2026. The theme for this year's event is "Harnessing Tanzania's Mineral Wealth for Renewable Energy, Digital Transformation and Societal Security (*Kutumia Utajiri wa Madini wa Tanzania katika Kukuza Nishati Jadidifu, Mageuzi ya Kidijitali na Usalama wa Jamii*)." The event is officially inaugurated on 9th June 2026 by the Honourable Anthony Mavunde (MP), Minister for Minerals, and concluded with an awards ceremony officiated by Prof. Carolyne Ignatius Nombo, Permanent Secretary in the Ministry of Education, Science and Technology, on 11th June 2026.

The RIW was introduced at UDSM in 2015 to provide a platform through which researchers, innovators, and students can showcase their research findings, innovations, and scholarly achievements. Since its inception, the University has consistently organized this annual event, except in 2020 when it was suspended due to the COVID-19 pandemic. RIW serves as an important mechanism for disseminating research outputs, innovative products, processes, and services, while enhancing public awareness of the University's contributions to national and global development. The event also supports the implementation of the UDSM Research Agenda (2018/19 - 2028/29), enhances institutional visibility, contributes to national development priorities, and fosters interdisciplinary collaboration and strategic partnerships with local and international public and private sector institutions. Furthermore, RIW promotes the advancement of knowledge and innovation as foundations for sustainable development, societal transformation, and economic growth.

The 11th RIW commenced with unit-level exhibitions held across Colleges, Schools, Institutes, and constituent colleges of the University. These exhibitions took place between May and June 2026 at the Mwalimu Julius Nyerere Mlimani Campus, Dar es Salaam University College of Education (DUCE), Mkwawa University College of Education (MUCE) in Iringa, Mbeya College of Health and Allied Sciences (MCHAS) in Mbeya, and the Institute of Marine Sciences (IMS) in Zanzibar. During these exhibitions, researchers and students engaged with the University community, stakeholders, and the general public through presentations and demonstrations of research findings, innovations, publications, consultancies, and public service initiatives. Altogether, 302 projects were assessed across nine categories during the unit-level competitions.

The most outstanding projects from the participating units were subsequently selected to compete at the University-level RIW. This year, 106 exemplary projects have been selected for exhibition and competition at the University level. In addition to the exhibitions, the event features several high-profile activities, including a Strategic Partnership Dialogue (SPD) and a Symposium, which provide opportunities for knowledge exchange, networking, and the establishment of collaborative partnerships aimed at advancing the University's research and innovation agenda.

To recognize and motivate excellence in research and innovation, outstanding staff and students will be honoured through a range of awards, including trophies, certificates, and cash prizes, based on rigorous assessment criteria. The projects and participants are evaluated under nine categories, namely: Category 1 – Best Research Project Group with Multidisciplinary Impact for the Year; Category 2 – Collaborative Researchers with Substantial Research Funding; Category 3 – Distinguished Researcher of the Year; Category 4 – Distinguished Innovator of the Year; Category 5 – Excellence Award for the Best Postgraduate Innovation Project; Category 6 – Excellence Award for the Best Undergraduate Innovation Project; Category 7 – Award for the Outstanding Strategic Transformation Project of the Year; Category 8 – Award for the Best University - Industry Partnership Project of the Year; Category 9 – Outstanding Consultancy Award for Securing High-Value Funding.

We are confident that the 11th UDSM Research and Innovation Week will continue to strengthen collaborative efforts among researchers, innovators, policymakers, industry, development partners, and communities in addressing societal challenges and advancing sustainable development through research and innovation.

On behalf of the University of Dar es Salaam, we thank all participants, partners, sponsors, exhibitors, judges, and stakeholders for their invaluable contributions to the success of this event. We hope that you find this Book of Abstracts informative and inspiring, and that you enjoy the 11th UDSM Research and Innovation Week 2026.

Prof. Nelson M. K. Boniface
Deputy Vice Chancellor - Research

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1.1 College of Engineering and Technology (CoET)

1.1.1 Safe System for radical improvement of road safety in low- and middle-income African countries: Advancing road safety in Tanzania

Jaqueline Masaki[1], Alex Lubida and Salma Makuti

Abstract

Road traffic injuries remain a major public health and development challenge in Africa, where the burden is intensified by rapid motorisation, mixed traffic, weak institutional coordination, inadequate road safety data, vulnerable road user exposure, and gaps in post-crash care. AfroSAFE, a Horizon Europe project on Safe System for radical improvement of road safety in low- and middle-income African countries, supports the transfer and local adaptation of Safe System principles in Tanzania, Ghana and Zambia. In Tanzania, the project advances evidence-based road safety management through systems analysis, road safety data and Safety Performance Indicator guidelines, road infrastructure safety management tools, vehicle safety and inspection recommendations, road safety culture research, post- crash care assessments, and pilot demonstrations. Capacity building is central to the approach, including Safe System training, road safety audit/inspection training for road authorities, curriculum integration at the University of Dar es Salaam, and knowledge exchange through the AfroSAFE Academy. The project strengthens local expertise, institutional uptake and practical implementation pathways for safer roads, safer users, safer vehicles, safer speeds and improved post-crash response. The Tanzania experience demonstrates how research, training and policy engagement can support sustainable road safety improvement tailored to African operating conditions.

Keywords: *Safe System, AfroSAFE, Road Safety, Tanzania, Vulnerable Road Users, Post-Crash Care*

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1.2 College of Humanities (CoHU)

1.2.1 Building International Cooperation through Collaborative Cultural Performances and Research in Higher Learning Institutions in Belgium and Tanzania

Zilpa Ombija and Daines N. Sanga[1]

Abstract

As Tanzania seeks to harness its mineral wealth to advance renewable energy, digital transformation, and societal security, there is increasing recognition that sustainable development requires not only technological and economic innovation but also cultural engagement and international cooperation. Cultural performances provide important platforms for knowledge sharing, public dialogue, and social reflection on contemporary development challenges. This two-year project, running from November 2025 to November 2027, establishes a collaborative partnership between the Department of Creative Arts at the University of Dar es Salaam (UDSM), Tanzania, and the Royal Institute for Theatre, Cinema, and Sound (RITCS), Belgium. The partnership aims to strengthen international cooperation through collaborative cultural performances, academic exchange, and joint research in the performing arts. The project responds to challenges facing higher education institutions and the creative sector, including limited international research collaboration, inadequate opportunities for artistic performance exchange, and insufficient global visibility for cultural practitioners. Through collaborative performances, workshops, researcher and student mobility, and performance-based research, the initiative creates a sustainable platform for intercultural learning and knowledge production between Tanzania and Belgium. The collaboration encourages artistic exploration of contemporary social and development issues, including natural resource governance, mining communities, environmental sustainability, renewable energy transitions, digital innovation, and societal resilience. A key component of the project is the integration of digital technologies in artistic production, documentation, dissemination, and research communication. A dedicated digital platform will host recorded performances, research outputs, and educational materials, thereby expanding access to cultural knowledge and contributing to ongoing digital transformation within the cultural and higher education sectors. Through artistic practice and scholarly inquiry, the project seeks to enhance public understanding of the social dimensions of development

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while promoting cultural diplomacy, social cohesion, and international partnerships.

Keywords: *International cooperation, cultural performance, natural resources, digital transformation, societal security, performance-based research, cultural diplomacy, sustainable development, Tanzania, Belgium*

1.2.2 Women's Voices as Agency in Cultural Production: A Critical-Semiotic Discourse Analysis of Pioneer Female Musicians in East Africa

Edith Natukunda[1], Zilpah Ombijah[2] Everlyn Kisembe[3]

Abstract

This study investigates women's voices as agency in cultural production through a critical-semiotic discourse analysis of three pioneer female traditional musicians in East Africa: Bi Kidude of Tanzania, Annet Nandujja of Uganda, and Suzanna Owiyo of Kenya. The study is motivated by the limited documentation, promotion, and scholarly analysis of women's contributions to traditional music in East Africa, despite their central role in preserving oral traditions, indigenous instruments, mother-language performance, cultural memory, and social critique. The study argues that documenting women's music as cultural production contributes to cultural heritage preservation by making visible the biographies, discographies, ownership status, and layered meanings embedded in the songs of underrepresented female musicians. The study will be guided by four specific objectives: to document the biographies of the three selected female traditional musicians; to investigate the state of music ownership and establish discographies where they are non-existent; to explore mechanisms for preserving traditional music as a cultural product; and to apply Critical Semiotic Discourse Analysis to selected songs in order to trace their cultural meaningfulness. Methodologically, the study adopts an interpretative qualitative approach, using narrative inquiry, conversational interviews, and Critical Semiotic Discourse Analysis. Data will be collected from the musicians or their close representatives, co-performers, musicologists, traditional and religious leaders, music producers and archivists,

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lay listeners, and educationalists across Tanzania, Uganda, and Kenya. A total of 39 key informant interviews are expected across the three countries. The analysis will combine thematic coding of narrative and interview data with a four-level semiotic discourse framework focusing on textual organisation, social action, individual roles, and epistemological meanings. The study is expected to contribute to cultural heritage preservation, gender-sensitive documentation of African traditional music, and scholarly understanding of how women's songs function as cultural texts, social critique, identity formation, and mechanisms of intergenerational knowledge transmission. The study seeks to reposition pioneering female traditional musicians from the margins of cultural memory to the centre of East African cultural production and preservation.

Keywords: *Women's voices; cultural production; traditional music; Critical Semiotic Discourse Analysis; East Africa*

1.3 College of Information and Communication Technologies (CoICT)

1.3.1 TanFish Market: A digital marketplace platform transforming fisheries trade in Tanzania

Eva Shayo[1]

Abstract

The TanFishMarket Digital Marketplace Platform is an innovative digital solution developed to strengthen fisheries trade systems within the Lake Tanganyika basin in Tanzania. The initiative was implemented through collaboration between the University of Dar es Salaam (UDSM) and the Food and Agriculture Organization of the United Nations (FAO) to address persistent challenges affecting fisheries communities, including limited market access, fragmented trading systems, weak logistics coordination, low digital participation, and limited access to market information. The project involved the design and development of a comprehensive digital marketplace ecosystem consisting of a mobile application and web-based platform components for buyers, sellers, transporters, and administrators. The platform integrates digital marketplace functionalities such as product listing, marketplace coordination, monitoring features, and user management systems aimed at supporting more structured and transparent fisheries trade processes. In addition to technology development, the project emphasized stakeholder engagement, digital literacy

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training, and vendor onboarding activities. A total of 202 fishery community members were trained on platform usage and digitally enabled trade processes, with strong participation from women and youth. The platform was successfully tested, validated, and officially handed over to FAO Tanzania on 18th February 2026, marking the transition into the operationalization phase. The TanFishMarket initiative demonstrates the growing potential of digital innovation in transforming fisheries value chains, strengthening digital inclusion, and supporting blue economy development in Tanzania. The project further highlights the importance of combining technology deployment with stakeholder engagement, institutional collaboration, and ecosystem readiness to support sustainable digital transformation within local communities

Keywords: *Digital Marketplace, Fisheries Value Chain, Blue Economy, Digital Innovation, Lake Tanganyika, Fishery Communities, Mobile Application, Platform Ecosystem, Digital Transformation*

1.4 College of Natural and Applied Sciences (CoNAS)

1.4.1 Battling Aflatoxins for Food Safety and Security: Sustainable Solutions for Exposure Risks and Control Strategies

Kessy F. Kilulya[1], Deus Mashauri, Frank Tenganiza, Regina P. Mtei, Clarence A. Mgina, Macarius P. Mtega[2], Khadija Ally[3], Sharifa Juma[4], Mambaga S. Muja[5], Fredrick A. Obedi[6], and Rehema A. Mkalenda[7]

Abstract

Aflatoxins are toxic secondary metabolites produced primarily by Aspergillus flavus and Aspergillus parasiticus, posing significant threats to food safety, public health, and agricultural productivity in Tanzania. Staple food crops such as maize and groundnuts are particularly vulnerable to contamination due to favorable tropical climatic conditions, inadequate post-harvest handling practices, and limited awareness among smallholder farmers. Chronic exposure to aflatoxins

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has been associated with severe health consequences, including liver damage, immunosuppression, and hepatocellular carcinoma. This project investigates the occurrence, distribution, exposure risks, and mitigation strategies of aflatoxin contamination in Tanzania. Food and feed samples, including maize, maize products, groundnuts, spices, coffee, poultry feeds, eggs, and chicken organs, were collected and analyzed from various regions of Tanzania, including Dar es Salaam, Dodoma, Arusha, Njombe, Kilimanjaro, Mwanza, and Zanzibar. Laboratory analyses were conducted to determine aflatoxin contamination levels and evaluate potential intervention strategies. The study further explored practical and sustainable approaches for reducing aflatoxin contamination throughout the food supply chain. Findings demonstrated that simple post-harvest and food-processing interventions, including groundnut peeling, improved storage practices, modification of cooking methods, and removal of maize husks before milling, significantly reduce aflatoxin concentrations. In addition, plant-derived essential oils exhibited strong antifungal properties and effectively inhibited fungal growth and aflatoxin production under storage conditions. The project has generated valuable scientific evidence on aflatoxin occurrence and mitigation while contributing to food safety, public health protection, and sustainable agricultural development. Furthermore, the study has enhanced research capacity through postgraduate training and dissemination of findings through scientific publications and international conferences. The outcomes contribute directly to the achievement of the United Nations Sustainable Development Goals, particularly SDG 2 (Zero Hunger) and SDG 3 (Good Health and Well-Being).

Keywords: *Aflatoxins; Food Safety; Food Security; Mycotoxins; Essential Oils; Post-Harvest Management; Public Health; Tanzania*

1.4.2 Developing an Eastern Arc and Coastal Forest Biodiversity Centre for Research, Training, and Public Engagement (HAZINA)

Flora Magige[1], Simon P. Loader[2], Flora Stephano, Christoph Liedtke[3], John V. Lyakurwa, Martha D. Chiduo, Yeremia J. Chuhila, Tim Davenport[4] and Wilirk Mrosso

Abstract

The Eastern Arc Mountains and Coastal Forests of Tanzania are globally recognized as biodiversity hotspots, harboring exceptional levels of species richness, endemism, and ecological importance. However, these ecosystems continue to face increasing threats from habitat degradation, climate change, unsustainable resource use, and biodiversity loss. Addressing these challenges requires strengthened scientific capacity, improved biodiversity documentation, and enhanced public engagement in conservation. The HAZINA Project, funded by the Hempel Foundation, is a collaborative initiative between the Department of Zoology and Wildlife Conservation at the University of Dar es Salaam, the Natural History Museum (United Kingdom), the Biological Station of Doñana–CSIC (Spain), and Re-Wild (USA). The project aims to establish a state-of-the-art Eastern Arc and Coastal Forest Biodiversity Centre through the renovation and modernization of the vertebrate wet collection museum at the University of Dar es Salaam. The Biodiversity Centre will serve as a national hub for biodiversity research, specimen preservation, scientific training, education, and public engagement. The facility will support the collection, curation, digitization, and long-term preservation of Tanzania's biological heritage while providing researchers, students, policymakers, and the public with access to valuable biodiversity information. The centre is expected to become a leading platform for biodiversity science, supporting Tanzania's commitment to conservation, sustainable development, and evidence-based environmental management. The project places strong emphasis on capacity building and human resource development. It is currently supporting the training of five MSc students and has recruited three professional curators to strengthen biodiversity collection management. Additional training opportunities are being provided to university staff, students, educators, and conservation practitioners in specimen curation, biodiversity informatics, collection management, exhibition development, and science communication. Through partnerships with national and international

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experts, including the National Museum of Tanzania, the project is developing a highly skilled workforce capable of managing a world-class biodiversity centre. Furthermore, the project will conduct biodiversity surveys and field expeditions in priority Key Biodiversity Areas (KBAs) across Tanzania to strengthen biological collections and generate new scientific knowledge on species diversity and distribution. These activities will provide practical training opportunities for students and early-career researchers while contributing to national and global biodiversity conservation efforts. Through infrastructure development, research, training, and public engagement, the HAZINA Project is creating a lasting foundation for biodiversity conservation in Tanzania and strengthening the country's capacity to address biodiversity loss and environmental change.

Keywords: *Biodiversity Conservation; Eastern Arc Mountains; Coastal Forests; Biodiversity Centre; Capacity Building; Natural History Collections; Public Engagement; Key Biodiversity Areas; Tanzania.*

1.4.3 Transforming Tanzania Resources into Sustainable Technologies through Chemistry-Driven Innovation

Makungu Madirisha[1], Regina P. Mtei, Geradius D. Kikumi, Kessy F. Kilulya, Nathaniel Komba, Leonard Akwilapo, Neema John, Arafa Msagati, Gloria Mlinga, Jasson M. Kaijage, Evalina Samba, Joseph Kumberi, Happiness Tosha[1], Nuru Patrick[1], Catherine Msomba[1], Aisha Mohamed[1], Rahma Mohamed[1], Julieth Kakwaya[1], Bolane D. Ikotun[2], and Martine Cyr[3]

Abstract

The project is a multidisciplinary research and innovation initiative that seeks to convert Tanzania's locally available minerals, industrial by-products, agricultural residues, and waste materials into sustainable technologies with significant industrial, environmental, and socio-economic impact. The project addresses key national challenges related to infrastructure development, clean water access, environmental pollution, waste management, renewable energy, and climate resilience through the integration of chemistry, materials science, engineering, and industrial innovation. The initiative focuses on translating scientific discoveries into field-deployable technologies and scalable industrial

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solutions capable of reducing dependence on imported materials, technologies, and chemical products. Through extensive research and development, the project has successfully generated several innovative technologies, including **Duracem** materials for sustainable cement concrete pavement systems, **Duracem 1A** technologies for stabilization of cold-mix asphalt in energy-efficient road construction, **Novacem** multifunctional construction materials, **FluoroGuard** technologies for fluoride-free drinking water production, **BentoX-TZ** technologies for drilling and sealing applications, **Fluxen** systems for biogas upgrading and clean energy generation, **GeoCatalytic** technologies for environmental pollutant degradation, and **low-emission coal briquette** technologies for cleaner fuel production. Several of these innovations have progressed beyond laboratory validation and entered field deployment through strategic partnerships with industry and development stakeholders. FluoroGuard technologies are being evaluated for fluoride removal in collaboration with the Water Research Centre in Arusha, while Duracem and Duracem 1A technologies are being deployed through collaboration with Starpeco Company Limited for sustainable road infrastructure applications. Furthermore, Fluxen biogas upgrading technologies are being implemented through collaboration with the ECHO East Africa Impact Center to improve access to clean and sustainable energy solutions. The project has established a strong platform for academia-industry collaboration, technology transfer, innovation commercialization, and capacity building. Through active involvement of undergraduate and postgraduate students, the initiative has strengthened practical research training, innovation skills, and entrepreneurship development. The project demonstrates the transformative role of chemistry-driven innovation in promoting sustainable industrialization, local technology development, environmental sustainability, cleaner production systems, and socio-economic transformation in Tanzania and beyond.

Keywords: *Materials Chemistry; Sustainable Technologies; Industrial Innovation; Clean Energy; Water Treatment; Road Infrastructure; Waste Valorization; Environmental Remediation; Technology Commercialization; Tanzania.*

1.5 College of Social Sciences (CoSS)

1.5.1 Explaining Inclusive lower-level urbanization in Tanzania and Uganda

Herbert Hambati Qambalo[1]

Abstract

The project studies lower level urbanization in Tanzania and Uganda, aiming to assess under what social, economic and spatial conditions that processes of urbanization at the lowest level of the urban hierarchy can promote the livelihoods and welfare of residents in small towns. In sub-Saharan Africa, future urbanization is considered to be driven by a set of negative rural pressures, rather than the attraction of urban areas. The continuing importance of agriculture characterizes urbanization, as opportunities outside agriculture are limited. Small towns take on a special role in this context: the majority of the urban population lives in cities below 300,000 inhabitants, 26% in small towns of less than 50,000 inhabitants. While linkages to agriculture are likely to continue to play a major role in urban livelihoods, kinship relations provide support in the absence of formalized systems of welfare provision. Theoretically the project combines perspectives from urban systems theory with perspectives on multi-local livelihoods to situate urbanization processes spatially and economically, with respect to the urban system, rural surroundings and local business structure, politically in terms of local governance and socially in relation to kinship and multi-local livelihoods. The poor theoretical understanding of the specific type of urbanization of most relevance to the urban transition - that is the growth of small towns - aggravates a general analytical and empirical mismatch. The distributional aspects of lower-level urbanization are undertheorized in the sense that we lack analytical models that place the dynamics of localized urban growth in relation to broader urban systems, rural surroundings and the livelihoods and social relations of people living in small towns (towns with up to 50,000 inhabitants). In turn this gap is related to the uni-scalar approach that characterizes current theoretical perspectives - a one-sidedness which may jeopardize the social and economic inclusion of the poor in urbanization processes. In response to these gaps, this interdisciplinary project uses a ground-breaking, multi-scalar methodology combining spatial analysis using geographical information systems (GIS) and remote sensing data analysis and the collection of primary quantitative data and qualitative interviews in selected 8 sites in Tanzania and Uganda respectively.

Keywords: *Inclusiveness, Lower-Level, Urbanization, Tanzania, Uganda*

1 College of Social Sciences

1.5.2 Strengthening knowledge, evidence use and leadership in the global south on forced displacement: with a focus on East Africa

Prof. Opportuna Kweka Project PI and Chair[1]; Active Members: Prof. Chris Peter Maina – Law, UDSM, Tanzania; Prof. Khoti Kamanga – Law, UDSM, Tanzania; Dr. Veronica Buchumi – Law, UDSM Tanzania; Dr. Petro Protas – Law, UDSM, Tanzania; Dr. Nickson Philbert – Law, UDSM, Tanzania; Dr. Ester Mlingwa- - Law, UDSM, Tanzania; Dr. Faraja Namkesa – Geography, UDSM, Tanzania; Dr. Saumu Ibrahim – Geography UDSM, Tanzania; Mr. Benezet Rwelengera – Geography, UDSM, Tanzania; Ms. Edith Benedict – Geography, UDSM, Tanzania; Dr. Johnstone Andrea – Geography, UDSM, Tanzania; Mr. Michael David Rikanga – Geography, UDSM, Tanzania; Ms. Glory Evarist Lyimo – Geography, UDSM, Tanzania; Dr. Ignatia Mbatta – Sociology, UDSM, Tanzania; Dr. Robert Katikiro – Agriculture and food, UDSM , Tanzania; Mr. Leonard Chimanda – Law – UDOM, Tanzania; Dr. Lekumok Kironyi – Agriculture, Mwalimu Nyerere Musoma, Tanzania; Mr. Dismas Nkunda – Journalist, Uganda; Dr. Tiberius Barasa – Political Science, Bomet University, Kenya; Dr. Theodore Mbazumutuma – Rema Burundi; Dr. Robert Turyahebwa – Law, University of Lay Adventist, Rwanda; Co-opted members: Prof. Robert Esuruku – Development studies, Muni – Uganda; and Dr. Joseph Mukasa – Development Studies, Uganda

Abstract

With the support of the International Development Research Centre (IDRC), the University of Dar-es-Salaam established the Research Chair on Forced Displacement. The Research Chair is located in the Department of Geography, College of Social Sciences, aims at conducting multidisciplinary demand driven, action-oriented research in two major types of forced displacement namely the refugees and internally displaced persons (IDPs). With the IDPS, the research expands to include those from conflict, but also climate change, disaster, conservation and development induced displacement. The main part of the research covers five East African countries namely Tanzania, Uganda, Kenya, Rwanda and Burundi where cases of displaced people have been identified. The Chair is served by national and international advisory boards. Researchers from different disciplines namely, Geography, Law, Sociology, Political Science, Economics, Development Studies, and Business School. The Chair embraces

1 College of Social Sciences

a gender-transformative multidisciplinary research approach. The Chair's main goal is to be able to do research, build capacity and mentor junior scholars and conduct outreach and inform policy on issues forced displacement. Specifically, the research, conducted by the Chair aims at raising the voices of the displaced people and global South scholars. Scholars are working on issues of livelihood, environment, durable solutions, social and legal protection, education and focus on agencies of the displaced and adaptation to achieving resilience. The Chair recommends for ways in which displacement policies can lead to democratic and inclusive governance; sustainable and economic inclusion of the displaced. The Chair has introduced a masters programme on human displacement and has ten publication and three books are under review. The Chair is working with the government, non governmental organizations and United national board and the East Africa Community in the policy uptake and outreaches

Keywords: *Forced displacement, Conflict, Climate, Disaster, Conservation*

1.5.3 Bits, Bytes and Bodies: Local Innovation and Digital Health Care in Tanzania (2023–2026)

Vendelin Simon[1]

Abstract

This project examines how digital health technologies are designed, used, and governed within Tanzania's evolving health system. Despite major global investments in digital health as a pathway to universal health coverage, concerns persist that high costs, weak regulation, and externally driven designs may undermine equity and local relevance. In response, this study investigates the meaning and practice of "local innovation" in digital health, asking whether it represents donor-driven technological fixes or enables more appropriate, context-sensitive solutions. Using a four-year multi-sited ethnographic approach, the project follows actors across sites where digital health is designed, implemented, and regulated. It focuses on technologists, healthcare workers, patients, policymakers, and international partners to understand how innovation emerges through everyday practices, institutional arrangements, and transnational collaborations. The research draws on anthropology, science and technology studies, and health policy to analyse digital health as a global assemblage shaped by uneven power relations but also by local creativity and critical reflection. By moving beyond narratives of technology transfer or passive recipients, the study foregrounds Tanzanian actors as active innovators.

1 College of Social Science

It contributes empirical and theoretical insights into digital health ecosystems and offers policy-relevant knowledge on how to strengthen governance, equity, and health system resilience through locally grounded digital innovation in Tanzania and beyond.

Keywords: *Bits, Bytes, Digital, Health, Technologies*

1.6 Dar es Salaam University College of Education (DUCE)

1.6.1 Tanzania Partnership Programme between Tanzania and the United States- EDUCATION CORE

Perpetua Urio[1], Maregesi Machumu[2] and Rehema J. Mwakabenga[3]

Abstract

The Tanzania Partnership Programme (TPP) is a collaborative initiative under the Partnerships for Sustainable Community Development that brings together Michigan State University, the University of Dar es Salaam, Sokoine University of Agriculture, and the Dar es Salaam University College of Education (DUCE). Implemented in Lindi and Monduli districts, the programme aims to improve livelihoods through integrated interventions in health, education, youth empowerment, and environmental sustainability. At DUCE, the programme focuses on strengthening education systems through teacher professional development, early childhood education, student engagement, and community-based learning initiatives. Key interventions include capacity building for teachers and school leaders, improvement of learning environments, promotion of play-based learning, and support for youth empowerment through practical and vocational skills development. Since 2017, the programme has also provided opportunities for student teaching practice and international engagement, strengthening links between universities, schools, and communities. Evidence from programme sites indicates improvements in teaching practices, student

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participation, school attendance, academic performance, and retention, particularly among girls. The experience of TPP demonstrates the value of multi-institutional partnerships in enhancing educational quality, promoting inclusive learning, and contributing to sustainable community development in Tanzania.

Keywords: *Tanzania Partnership Programme, Teacher Professional Development, Community Engagement, Youth Empowerment, Early Childhood Education, Educational Partnerships*

1.6.2 In Silico and In Vitro Approaches for Antimicrobial Activity Assessment: Integrating Computational Tools with Minimum Inhibitory Concentration Determination

Sixberth Mlowe[1], Paul Lucas[1], Anthony A. Tepeli[1], Zaituni Msengwa[2], Baraka Ndiege[2], Fatuma Ally Abubakary[3]

Abstract

Antimicrobial resistance (AMR) poses a growing global health challenge, necessitating the development of reliable methods for evaluating antimicrobial efficacy and supporting evidence-based clinical decision-making. This workshop integrated in vitro antimicrobial susceptibility testing with emerging in silico approaches, including computational analysis, artificial intelligence (AI), and predictive modeling, to enhance the assessment of bacterial resistance patterns and novel antimicrobial agents. The study focused on the determination of Minimum Inhibitory Concentration (MIC) against Staphylococcus aureus and Methicillin-Resistant Staphylococcus aureus (MRSA) using broth microdilution, broth macrodilution, and agar dilution techniques. Standardized bacterial inocula were prepared using the 0.5 McFarland standard, and serial dilution procedures were employed to evaluate antimicrobial activity. Broth microdilution results revealed MIC values of 0.000488 mg/mL against both S. aureus and MRSA. Minimum Bactericidal Concentration (MBC) assessment indicated bacterial growth at tested concentrations, suggesting that the tested compound exhibited bacteriostatic rather than bactericidal activity. Agar dilution experiments demonstrated inhibition of bacterial growth at concentrations ≤0.001 mg/mL, while broth macrodilution established an MIC of 0.004 mg/mL.

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The consistency observed across dilution techniques confirmed the reliability of MIC determination methods for antimicrobial susceptibility assessment. The workshop further highlighted the potential of integrating computational tools, AI-assisted data analysis, and predictive modeling with laboratory-based antimicrobial testing to improve resistance surveillance, support antimicrobial stewardship, and accelerate the discovery of novel therapeutic agents. The combined in silico and in vitro framework provides a valuable platform for strengthening antimicrobial research capacity and enhancing evidence-based responses to the growing threat of antimicrobial resistance.

Keywords: *Antimicrobial Resistance, Minimum Inhibitory Concentration, Antimicrobial Susceptibility Testing, MRSA, Artificial Intelligence, In Silico Modeling, In Vitro Assays.*

1.7 Institute of Resource Assessment (IRA)

1.7.1 Tanzania Partnership Programme

Joel Nobert[1] and Estella Mgala

Abstract

The Tanzania Partnership Program (TPP) is a long-term, collaborative initiative under the Partnerships for Sustainable Community Development (PSCD). Since 2011, TPP has worked in two villages Milola in Lindi Region and Naitolia in Arusha Region, bringing together local and international partners to strengthen rural livelihoods through integrated, community-led development. Building resilient and sustainable rural communities requires a multifaceted approach, integrating local knowledge, technical expertise, and multidisciplinary collaboration. The Tanzania Partnership Program (TPP) is a long-term initiative focused on improving livelihoods and promoting sustainable development in Tanzania. This collaborative effort involves Michigan State University (MSU), University of Dar es Salaam (UDSM), Sokoine University of Agriculture (SUA), Milola Ward, Lindi Municipal Council, Naitolia Village, and Monduli District. Partnerships for Sustainable Community Development (PSCD) and the Tanzania Partnership Program (TPP) have introduced collaborative and creative solutions to poverty and hunger-related challenges facing rural communities in Tanzania. The program has completed water infrastructure and

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management projects, increased access to health services, helped develop and improve infrastructure for schools, and provided resources for better and more effective agricultural management. Now 16 years into operation, PSCD has made substantial progress in Tanzania. Challenges to sustainable development in a world ravaged by political interference, pandemic diseases, climate change, and social unrest are profound. Now, more than ever, the PSCD collaborative model is positioned to be an instrumental asset to combat hunger, inequality, and changing environmental conditions. The program has been implemented through the identified three core programs as follows.

Core Program I: Community Health and Food Security

Human and animal health are key aspects of a sustainable community. Yet, for most rural communities, access to quality healthcare, both for humans and animals, is largely absent or inadequate. Moreover, pervasive food insecurities arising from adverse weather conditions, poor agricultural practices, and limited access to productive resources leave many rural inhabitants malnourished and/or undernourished with weak immune systems to fight diseases. Livestock contribute to food production, income generation, and draught work for agriculture. However, maintaining the productivity of livestock is negatively impacted by disease and inadequate veterinary services. More recently, drought and lack of water in our target communities have increased livestock morbidity and mortality, thereby threatening the basic livelihoods of rural communities.

Core Program II: Community, Education, Economic Development, and Youth Empowerment

This core program seeks to promote and improve both access to and the quality of education by focusing on gender issues, student learning, teacher professional development, and the educational context in which students learn. It emphasizes entrepreneurial and life skills development reflective of the local context but also befitting of the knowledge and technology-intensive workforce.

Core Program III: Water Resource and Environmental Management

This core program prioritizes access to safe water and environmental conservation as a major theme. It seeks to improve the supply of water and sanitation infrastructure, strengthen communities' management capacity to adopt and sustain water and sanitation infrastructure, foster community-driven conservation efforts, and enhance resilience against climate change-related impacts.

Key Achievements

The program aims to address the complex needs of rural communities through participatory development and long-term solutions. In the past year,

TPP continued to implement key initiatives across three core program areas: Community Health and Food Security. This program enhanced food security through a school feeding initiative at Engusero Preschool, supporting 50 children and providing 56.7% of the food required for Naitolia Primary School's feeding program. TPP also facilitated crop production on 11.5 acres of school gardens and farms to sustain the school feeding initiative. At Milola Secondary School (MSS), a poultry project produced 3,300 trays of eggs, supporting both food security and local income generation. Monthly mobile clinics in Ngwenya Village provided health services to 496 patients, while livestock interventions included the construction of essential infrastructure and the dipping of over 22,000 cattle to combat tick-borne diseases. Additionally, student-led livestock activities in Mswakini Ward contributed to improved veterinary service delivery. Secondly is the Community Education, Economic Development, and Youth Empowerment program, which supported education by placing six UDSM student teachers at MSS to improve performance in science subjects, and two interns who assisted in both teaching and the poultry project. Entrepreneurship and life skills training reached 250 MSS students, while adult literacy programs across five villages enabled 95 learners to achieve basic reading, writing, and numeracy skills. Educational support was extended through scholarships for 32 master's students and seven secondary and vocational students. Professional development training was also provided to 96 teachers. TPP collaborated with MWEDO to initiate community economic groups and youth mentorship projects at Mswakini Secondary school, as well as constructing a teacher residence and improving playgrounds at various schools in the project areas. Water Resource Management and Environmental Conservation Rainwater harvesting systems were upgraded at the MSS girls' dormitory and extended to 120 households in Naitolia Village. A Training of Trainers (ToT) course on managing human-wildlife conflicts was also conducted in Milola Ward, contributing to better local environmental management. Developing Naitolia Restoration Model to control soil erosion and reduce the spread of invasive plant species in Naitolia village. *The goal is securing livelihood and sustaining human-wildlife coexistence by controlling soil erosion and reducing the spread of invasive species in Naitolia Village, Tanzania.* Despite challenges, TPP has made significant strides in fostering sustainable community development in Naitolia and Milola, emphasizing the importance of collaborative, locally driven approaches to solving complex development issues.

Keywords: *Tanzania, Partnership, Sustainability, Food, Poverty*

1.7.2 Young People's Engagement in Climate Change in Tanzania

Catherine Masao[1] and Edmund Mabhuye

Abstract

Climate change heavily impacts youth in sub-Saharan Africa, yet they hold immense potential to drive transformative solutions. Because most youth climate data stems from the Global North, the Y-ENGAGE project addresses critical knowledge gaps by exploring the lived experiences, vulnerabilities, and adaptation strategies of young Africans in their everyday lives. Research is conducted across five Tanzanian districts: Singida, Manyara, Monduli, Kibiti, and Liwale. The project examines how youth understand climate change, its effects on their livelihoods, their coping strategies, and how dialogical learning approaches in schools can foster meaningful youth participation. A distinctive feature of Y-ENGAGE is its innovative use of Photovoice, a participatory research approach where young people act as active co-researchers, utilizing photography to document and communicate community realities. These photographs serve as powerful tools for reflection, dialogue, and advocacy. To strengthen local ownership and sustainability, the project trains peer researchers directly from the study communities to lead data collection and local discussions, ensuring that the generated skills and networks remain within the communities beyond the project's lifespan. Through this integrated approach, Y-ENGAGE is generating fresh insights while developing a new generation of climate leaders, researchers, and informed citizens in Tanzania.

Key Accomplishments to Date

1. **Academic Capacity Development:** Completed training for two Postdoctoral researchers and currently supports seven PhD candidates across participating institutions.
2. **Scientific Publication:** Produced several published peer-reviewed scientific papers, with additional manuscripts actively under preparation.
3. **Resource Creation:** Developed school-based learning guides to support capacity building in participatory research and climate studies.
4. **Institutional Infrastructure:** Established and operationalized the Y-ENGAGE Youth Lab at IRA-UDSM, creating a vibrant platform for university and college students to network, learn, and co-create climate solutions.

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5. **Community Knowledge Transfer:** Developed unique climate change exhibition materials based on Photovoice findings; these are currently in English, with plans underway to translate them into Kiswahili for community feedback and localized action.

Expected Outputs and Outcomes

The project guarantees the successful completion of training for two Postdoctoral researchers and seven PhD candidates, alongside a continuous pipeline of peer-reviewed scientific publications and advanced Photovoice methodologies. Through the operationalization of the Y-ENGAGE Youth Lab, the project delivers increased youth participation, leadership, and innovation in climate action. Furthermore, translating and sharing exhibition materials in Kiswahili will strengthen community ownership of climate knowledge. Ultimately, Y-ENGAGE provides evidence-based recommendations and school-based training guides designed to inform national climate policy, educational curricula, and youth-focused environmental interventions.

FINANCIAL SUPPORT: The project receives funds from DANIDA.

Keywords: *Climate Change, Youth, Sub-Saharan, Africa, Engagement*

1.7.3 The Role of Urban-Rural Linkage for Enhanced Resilience in Rural Tanzania

Noah Pauline Makula1, Pius Z. Yanda, Victoria Mushy, Edmund Mabhuye, Søren Bech Pilgaard Kristensen, Torben Birch-Thomsen, Anne Gravsholt Busck, Emilie Beauchamp, Thomas Lundhede, Sam Greene, Omary Thabiti Mndeme, Richard Innocent Ponda, Scolastica David Mwema, Rose Kichereri.

Abstract

Climate change is increasingly affecting rural livelihoods and food security worldwide. In Tanzania, it is recognized as a major threat to achieving the country's development vision 2025, which prioritizes poverty eradication, women's empowerment, and economic diversification. The National Five-Year Development Plan 2021/22–2025/26 (FYDP III) acknowledges the urgent need for strategies that strengthen resilience to climate change. One critical but often overlooked area is the role of **ruralurban linkages** in building resilience. For decades, small towns in Tanzania have been growing rapidly, serving as hubs for

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trade, services, and information. Yet, climate policies have tended to focus either on rural villages or large cities, leaving a gap in understanding how everyday flows of people, goods, and knowledge between villages and towns shape resilience. The **RUL4CLI project (2022–2027)** was designed to fill this gap by studying how rural communities near small towns adapt differently to climate shocks compared to remote villages. By focusing on women and youth, the project ensures inclusivity in resilience strategies, recognizing that these groups face unique barriers in accessing urban resources. By reframing resilience as a relational process built through ruralurban linkages, RUL4CLI is showing that small towns are not just growth centers but vital hubs for climate adaptation. This project is laying the foundation for more inclusive, evidencebased policies that strengthen Tanzania's ability to meet its development goals in the face of climate change

Achievements:

i. Knowledge sharing workshops have been held to ensure communities benefit directly from scientific insights.

ii. Establishment of and close collaboration with Scientific Advisory Board for broader policy dialog and advocate.

iii. Mentorship of PhD students through multidisciplinary research and exchange programs between the University of Dar es Salaam and Copenhagen University

iv. Scientific papers and working papers under review.

Development of three (03) policy brief with recommendations for policy makers.

Keywords: *Climate Change Adaptation, Rural Resilience, Governance and Policy*

1.8 School of Journalism and Mass Communication (SJMC)

1.8.1 NORPART Project: Expanding Horizons in Journalism and Media Studies

Eva Solomon1

Abstract

Journalism education on global issues such as climate change, war, conflict and peace, and illicit financial flows calls for global perspectives, multinational groups of students, and a truly multilingual and multicultural group of teachers. The key goal of the project 'Expanding Horizons in Journalism and Media Studies' is to enhance the quality of higher education of journalists in the six partner countries: Colombia, Nicaragua, Norway, South Africa, Tanzania, and Uganda through mutual student mobility and cooperation. Through an approach combining the mobility of students and lecturers, and new innovative student active learning methods (MOOCs and COIL), the project aims to establish processes to create a learning environment that can foster the education of journalists better suited to prepare students for global challenges of our times. To reach the overall aim, the project focuses on training, students and staff mobility, research and publishing in key media and journalism areas namely gender and the media, investigative journalism, conflict reporting and climate change journalism.

Keywords: *Climate change, Horizon, Journalism, Media, Studies*

1.8.2 The Great Game of Media and Politicism Africa: Geopolitics and Media Interventions

Zuhura Selemani Khateeb[2], Elisha Magolanga[3]

Abstract

Sub-Saharan Africa (SSA) as the focus of this study, is rooted in communication and journalism studies but strongly interdisciplinary in nature as it has become one of the main target regions for competing political, economic, and military

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interventions amid fundamental global geopolitical shifts. This applies to both Western countries and BRICS states. In the crisis-ridden regions of the African continent, media face particularly challenging conditions. For several years now, long-standing and emerging BRICS countries such as Russia, China, India, Brazil, South Africa, Iran, Saudi Arabia, the UAE, and Turkey have significantly expanded their media engagement in Sub-Saharan Africa, driven by geopolitical, economic, and/or military interests. In the altered geopolitical landscape post-2022, these BRICS states formerly recipients of Western media development cooperation (MEZ) are now emerging as competitors to Europe, the USA, Canada, Australia, and Japan. The strategies of BRICS actors, differ fundamentally from the strategic approach of Western stakeholders. While Western MEZ actors focus on capacity building i.e., offering training and education (intangible goods), on the other hand BRICS countries often provide their African partners with technical and material goods such as newsroom equipment, media infrastructures like mobile networks. Additionally, they supply free content from news agencies (e.g., Xinhua) and AI-translated video/audio material adapted for African broadcasters. In doing so, BRICS actors exploit the severe resource shortages of many African newsrooms. The two years' international project aims to examine how media interventions by BRICS countries are affecting African newsrooms and journalism cultures. It intends to answer three main questions: how do China, Russia, Turkey (as well as Saudi Arabia, United Arab Emirates, and potentially further BRICS countries) impact media in sub-Saharan Africa; how do they involve with newsrooms, journalism educators, and media policy-makers; and how do they affect these key actors in the African sample study countries. Also, it will analyse the impact of Western vs BRICS media interventions as a form of competition in local markets for media development in seven African countries, focusing especially on their effects on newsrooms and institutions of journalism education, which have long-term implications for public spheres. This study is comparative and international in scope, which will employ a "most different systems design" that encompasses a diversity of political systems, media systems, journalism cultures, media markets, audiences, and culturally shaped value systems within Africa. It will also use a triangulation of quantitative, qualitative, and experimental methods, to capture the narratives and quantification of the information. Data will be collected through desk study, qualitative expert interviews, and a pilot experimental design. The project builds on collaborations between the Erich Brost Institute (EBI), Germany, and eight partner universities from seven countries in sub-Saharan Africa, which are University of Dar es Salaam, Tanzania; Makerere University, Uganda; Daystar University, Kenya; Port Harcourt University, Nigeria; Central University, Ghana; University Thomas Sankara, Burkina Faso;

University Joseph Ki Zerbo, Burkina Faso; and Malawi University of Business and Applied Sciences, Malawi.

Keywords: *Geopolitics, BRICS, Western MEZ, SSA, journalism, journalism cultures, media systems, African newsrooms, political systems*

1.9 School of Education (SoED)

1.9.1 Digitalizing School-Community Partnership as a Leadership Strategy for Strengthening School Support System in Under-resourced Schools in Tanzania

George Kahangwa; Juliana Bachilula[1], Beni Mbwile; Daudi Mrema[2], Marcellina Mjenda[3], Mr. Elias Mbwile[4]

Abstract

School-community partnerships (SCPs) are widely recognised in literature as collaborative frameworks that bring together parents, teachers, NGOs and other community actors to enhance the school support system (SSS) through providing academic assistance, psychosocial care, and material support. The partnerships function most effectively when educational leaders can intentionally organise and institutionalise partnership activities through clear roles and coordination mechanisms that deepen community contributions to schooling. In Tanzania, despite the sustained expansion of formal schooling, the country continues to experience persistent weaknesses in SSS, particularly in under-resourced schools. As such, many schools operate below minimum quality thresholds. Guided by the School-Family-Community Partnership Theory and Theory of change Frameworks, the current study delves how school leadership may leverage SCP to enhance SSS and therefore address the predicament of resource scarcity in schools. The study purpose therefore, is to promote the use of SCPs as a leadership strategy to strengthen SSS in Tanzania. Its objectives are to examine the community's willingness to support schools; assess school leaders' ability to lead SCPs for strengthening SSS; develop and apply a digital model of SCPs that can foster remote communication and mobilisation activities to strengthen SSS; and evaluate capacity building intervention and the SCP digital model application in strengthening SSS. Designed as Action research, the

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study entails baseline, planning to intervene, actions, analysis/evaluation and conclusions. Key education officials, school administrators and community representatives from selected districts in Songwe, Tanzania are involved.

Keywords: *Partnership in education, School support system, Digitalisation, Communication, Mobilisation*

1.10 University of Dar es Salaam Business School (UDBS)

1.10.1 Co-producing knowledge on sustainable growth through service-learning pedagogy between African and European HEIs

Theresia Busagara[1] Fred Okangi[2]

Abstract

Graduate employability, entrepreneurship and practical skills development remain major concerns for higher education institutions in Sub-Saharan Africa. In Tanzania, the 2022 Population and Housing Census employment analysis shows that the country had about 20.7 million youths aged 15 to 35 years, of whom 15.7 million, equivalent to 76.0%, were participating in the labour force. Despite this participation, youth unemployment remained a serious concern, with the unemployment rate among youths aged 15 to 35 years standing at 9.5%. The situation is more severe in urban areas, where youth unemployment reached 15.9%, compared with 5.0% in rural areas. More importantly, unemployment among youths with university and other higher education was 14.2%, with female graduates more affected at 17.0% compared with 11.8% for male graduates. In addition, about 24.4% of youths were not in employment, education or training, while about 3.6 million were engaged in informal non-agricultural activities. These statistics indicate a persistent gap between higher education, practical skills, employability and labour-market absorption. The COPAFEU project, Co-Producing Knowledge on Sustainable Growth through Service-Learning Pedagogy between African and European Higher Education Institutions, responds to this challenge by promoting Enhanced E-Service Learning as a practical teaching and learning approach. Implemented through Erasmus+ collaboration, the project strengthens the capacity of higher education institutions to produce graduates who are employable, entrepreneurial, digitally competent and able to contribute to sustainable local growth. It brings

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together African and European universities, including the University of Dar es Salaam, to promote practical learning, university-community engagement, knowledge co-production and shared value creation. The project strengthens staff capacity, improves students' practical and digital skills, promotes inter-African collaboration and creates value with firms, entrepreneurs, innovation hubs, NGOs and labour-market actors. Through Enhanced E-Service Learning, students, lecturers, communities and partners jointly identify real-life challenges and co-produce practical solutions, thereby developing problem-solving, teamwork, communication, entrepreneurship, innovation and value co-creation skills. This project is implemented equally in four countries in Africa (Tanzania, South Africa, Ethiopia, and Nigeria) while the European partners stand as overseers and leaders to the project.

Keywords: *COPAFEU, Enhanced E-Service Learning, Graduate Employability, Youth Unemployment, Entrepreneurship, Digital Skills, Knowledge Co-production, Sustainable Growth.*

1.10.2 Engendering rural entrepreneurship and agribusiness for sustainable development (ENGAGE II)

Goodluck Charles[1], Mohamed Semkunde, Aloyce Hepelwa[2], Hezron Makundi,[3] Alfred R. Bizoza[4], Linley Chiwona Karltun[5], Franklin Amuakwa-Mensah[6]

Abstract

Despite the growing consensus that rural entrepreneurship and upgrading agricultural value chains can fast-track inclusive growth and sustainable rural development, poverty remains a rural phenomenon in Tanzania. The main problem and gap to address are the non-inclusive agricultural value chains. Evidence shows that much as 67% of those engaged in agriculture are women and youth, dominating the lower levels and nodes in the agricultural value chains, and that they are absent in the most profitable upper nodes. The need to overcome persistent gender inequalities in agri-value chains and charting women's and men's positions and outcomes in specific value chains is therefore

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both significant and urgent. Yet, research capacity in gender-informed value chain approaches in agriculture and rural entrepreneurship is inadequate and remains rudimentary. To address the identified research capacity gap, the ENGAGE II project aims to: build research capacity in engendering rural entrepreneurship through postgraduate training; strengthen the University publication record and dissemination as well as uptake of the research findings; build and strengthen regional collaboration; enhance the use of Tanzanian research in gender and rural entrepreneurship; and enhance entrepreneurial capacity in rural areas, especially for women and youth entrepreneurs, through different outreach programs. The project will train 5 PhDs in gender, rural entrepreneurship and agribusiness; establish a multidisciplinary Regional Centre of Gender and Rural Entrepreneurship (RCGRE), and upscale academia-community linkages by establishing the University Village Partnerships (UVPs). The approach chosen integrates multidisciplinary scientific research training with participatory action research through the RCGRE and UVPs. It supports research application, and market linkages for UDSM innovations through UVPs which will create technology demonstration sites and linkages for the UDSM innovations. The Regional Centre will promote research on gender and rural entrepreneurship by organizing regional courses, national dialogues and mobilizing research funding. Through the partnership with local governments, agri-business associations and local business networks, the Centre will facilitate dissemination of research findings and support evidence-based policy decisions. The UVPs will upscale the academia-community linkages with local governments, rural women entrepreneurs, community groups and service providers focusing on gender inclusive value chain upgrading, market linkages and technology use. The project has made significant progress across its key activity streams. All five PhD students have commenced their studies, completed their coursework, and conducted baseline surveys in their respective research areas. In postdoctoral research, both Postdoc researchers have completed their assignments and collectively produced nine manuscripts, six already submitted to Q1 and Q2 peer-reviewed journals and three currently underway, substantially exceeding the minimum requirement of four articles. The establishment of the Regional Centre of Gender and Rural Entrepreneurship (RCGRE) is nearing completion, with 95% of the set-up activities accomplished. Regarding the University Village Partnerships, UVPs have been identified and initial stakeholder engagement has commenced in six regions (Arusha, Dodoma, Kilimanjaro, Mbeya, Morogoro and Tanga). Memoranda of Understanding are currently being negotiated between the project, acting on behalf of UDSM, and the respective village administrations. Capacity-building activities are under way, with both opportunity identification sessions and financial literacy training successfully

delivered across all the established UVPs

Keywords: *Gender, Rural Entrepreneurship, Agricultural Value Chains, University Village Partnership, Regional Collaboration and Academia Community Linkages*

1.11 University of Dar es Salaam School of Economics (UDSE)

1.11.1 Environment for Development initiative (sub-project: Chemical safety and environmental stewardship in household horticulture: practices and knowledge gaps

Martin Chegere[1], Matilda Ntiyakunze[2], Innocensia John[3], and Kelvin Rugaimukamu[4]

Abstract

This study examines the practices, knowledge, and safety measures related to the use of farm chemicals among household horticultural farmers of Arusha, Tanzania. It highlights significant gaps in both training and knowledge about chemical safety. While 38% of farmers have received chemical usage training, crucial areas such as regulatory compliance (19.57%) and environmental considerations (44.20%) are notably underrepresented. This lack of knowledge is further compounded by low awareness of how to read safety labels (23.55%) and limited familiarity with techniques to reduce contamination (19.94%). Although farmers are aware of the health risks to themselves (71.47%), their understanding of the risks to consumers and the general public remains comparatively lower. The research also explores the safety measures adopted by farmers during chemical application. It reveals that 91% of farmers use chemicals, with 47% applying both pesticides and fertilizers. Despite the widespread use of chemicals, adherence to protective gear is inconsistent. While 42% of farmers always use personal protective equipment (PPE), 24% either rarely or never use it. Although 90% of farmers read safety labels, only 52% consistently follow the instructions, indicating significant room for improvement in compliance. Moreover, the study investigates the chemical application methods used by

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farmers. All respondents who apply chemicals rely on spraying techniques, with adult males predominantly responsible for implementing safety measures. Most farmers (70.64%) follow the manufacturer's instructions for mixing chemicals, but a notable portion (23.55%) rely on personal judgment. The timing of chemical applications is mainly based on pest and disease thresholds (72.48%), rather than environmental conditions. Post-application practices are mixed, with only 44% properly disposing of chemical containers according to safety guidelines. Finally, the study assesses the environmental impact and health effects of chemical use. While 53.37% of farmers follow guidelines to prevent chemical runoff near water bodies, very few adopt advanced practices such as integrated pest management (0.56%) or crop rotation (1.69%). Health-related symptoms such as headaches (42.51%) and extreme tiredness (46.48%) were frequently reported, suggesting exposure to harmful chemicals. Furthermore, only 13.76% of farmers are well-informed about regulatory requirements, highlighting the need for enhanced education on legal and safe chemical practices. In conclusion, the study identifies critical gaps in farmer education regarding chemical use, health risks, and environmental sustainability. Key recommendations include strengthening training programs on regulatory compliance, promoting safer application methods, improving access to protective gear, and raising awareness of alternative farming practices to reduce chemical dependency.

Keywords: *Chemical Safety, Farm Chemical Usage, Training and Awareness, Environmental Impact, Health Risks, Pesticide Application*

1.11.2 Well-being in a Sustainable Economy Revisited (WISER)

Martin Chegere [1] and Winnie Muangi[2]

Abstract

This study examines two interconnected dimensions of human well-being among Tanzanians: subjective well-being (SWB) shaped by emotional experience and social capital, and the influence of food security on life satisfaction. Conducted under the WISER (Well-being in a Sustainable Economy Revisited) project, it combines primary survey data with national secondary datasets to understand the psychological, social, and economic factors shaping quality of life in a low- and middle-income setting. The first study investigates positive affect, life satisfaction, and social capital across 397 respondents from ten districts representing all major geographical zones of Tanzania, using a mixed-methods

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design pairing quantitative surveys with focus group discussions. Respondents report consistently high positive emotional states alongside low psychological distress, yet life satisfaction is strikingly low, with a majority dissatisfied with their living conditions, achievements, and prospects. Social capital functions as a double-edged factor: trust and reciprocity buffer stress and strongly predict higher life satisfaction, with trust emerging as the key pathway through which emotions translate into favorable life evaluations. However, the same structures impose financial strain, conformity pressure, and role overload, with more than half of respondents regularly sacrificing personal needs for communal obligations. Network size and community participation correlate negatively with life satisfaction, revealing a paradox of emotional positivity constrained by social and economic pressures. The second study analyzes four waves of the Tanzania High-Frequency Welfare Monitoring Phone Survey (HFWMPS) using Correlated Random Effects (CRE) probit models to assess how food security affects well-being across general, food-related, health-related, and income-related domains. Food insecurity consistently and substantially reduces well-being in every domain. Worry about food, reduced dietary diversity, skipped meals, and full days without eating all lower the probability of reporting happiness, with hunger episodes producing the strongest negative effects on food satisfaction and clear declines in perceived health and financial security. Availability of staple foods such as maize flour, rice, and beans reduces insecurity, while rising prices worsen it, exposing inflationary vulnerabilities that disproportionately affect rural households and women. In conclusion, the studies jointly demonstrate that Tanzanians display strong emotional resilience yet low life satisfaction, with social capital offering support while imposing real burdens, and food insecurity undermining well-being across emotional, cognitive, and health dimensions. Key recommendations include strengthening trust-based social capital while reducing the economic costs of communal participation, stabilizing food prices, improving access to nutritious staples, and targeting support toward rural and economically vulnerable groups to enhance both food security and overall quality of life.

Keywords: *Subjective Well-Being, Social Capital, Life Satisfaction, Food Security*

1.11.3 How are the changes in Climate affecting agricultural employment and poverty among young people? Lesson from Tanzania

Selejio, O[1], Mdadila, K[2], Joel. E [3], and Karline Tryphone Elias [4]

Abstract

This study examines how climate variability affects agricultural employment, productivity, and poverty among youth-headed farming households in Tanzania, where agriculture contributes about 26% of GDP, 24% of export earnings, and employs roughly 65% of the labour force. It identifies targeted interventions to enhance resilience through improved access to resources, integration of climate-smart technologies, and supportive policies that sustain both domestic food security and the sector's contribution to exports. The analysis draws on the nationally representative Tanzania National Panel Survey, using Waves 4 (2014/15) and 5 (2019/20/21) to construct a balanced panel of 338 households headed by people aged 18 to 45 who cultivate maize. This data was merged with long-term climate records from 1960 to 2020, extracted from satellite imagery and processed using machine learning and geographic information systems, with climate variability measured as the deviation of rainfall and temperature from local long-term averages. The study applied descriptive statistics alongside probit, random effects, fractional logit, and multivariate probit models to assess participation, productivity, poverty, and the simultaneous adoption of coping strategies. The findings reveal that youth-headed farming households rely heavily on rain-fed agriculture, hold small landholdings averaging 2.4 acres, and have limited access to modern technologies, with only 42.3% using improved seeds, 22.5% applying inorganic fertilisers, and just 0.3% using irrigation. Rainfall variability declined slightly in 2020 relative to 2014 with fewer extreme outliers, while temperature variability remained stable. Poverty levels among young farmers are higher than among those relying on other income activities, underscoring the fragility of agricultural livelihoods under changing climatic conditions. The study further shows that climate variability exerts only a modest direct effect on youth participation in agriculture; instead, access to land, finance, and extension services are the more decisive determinants of engagement. Agricultural productivity is driven primarily by socioeconomic characteristics, input use, and soil quality. Although direct climate effects are weak, the cumulative impact of rainfall and temperature shocks worsens household poverty, particularly among larger households lacking adaptive capacity.

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Coping strategies remain largely low-cost, including intercropping, reliance on non-farm income, and use of improved seeds, reflecting limited financial resources to adopt costlier but more effective measures such as irrigation. In conclusion, the study finds that institutional and socioeconomic barriers, rather than climate variability alone, are the principal constraints on youth agricultural livelihoods. Key recommendations include expanding access to land, finance, and extension services, integrating climate resilience with poverty reduction goals, scaling high-cost climate-smart practices through subsidies and credit, strengthening public-private-NGO partnerships, and supporting youth adoption of modern technologies via training institutions, farmer field schools, and digital extension platforms.

Keywords: *Climate Variability, Youth Agriculture, Poverty, Productivity, Climate-Smart Agriculture*

1.12 Mbeya College of Health and Allied Sciences (MCHAS)

1.12.1 Neurocysticercosis and cognitive impairment among people with epilepsy in Taenia solium endemic regions of rural Tanzania: A hospital-based cross-sectional study in mental health clinics of selected sites in Tanzania

Charles E Makasi[1], Bernard Ngowi [2], Michael J Mahande[3], Tamara M Welte[4], Dominik Stelzle [5], Godfrey Guga[6], Veronika Schmidt [7], Charlotte Rüther[8], Yakobo Lema[9] , Ulrich Fabien Prodjinotho[10], Andrew Kilale , Clarissa

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Prazeres da Costa[1], Blandina T Mmbaga[2], Andrea S Winkler[3]

Abstract

Introduction: Epilepsy poses a significant public health problem in many parts of the world. The majority of people with epilepsy (PWE) are from low-income and middle-income countries. *Taenia solium* neurocysticercosis (NCC) is estimated to cause 30% of preventable epilepsy in PWE in areas of *T. solium* endemicity. This study was conducted to assess the prevalence of NCC in PWE, evaluate the presence of cognitive impairment in PWE and assess potentially contributing factors.

Methods: PWE were recruited within a mental health clinic-based cross-sectional study in rural Southern Tanzania. PWE underwent a detailed neurological examination, including mental state, and a blood sample was collected for *T. solium* cysticercosis (CC) serology testing. Patients who were serologically positive for CC and those detected to have prominent neurological deficits apart from epilepsy were invited to receive a cerebral computed tomography (CT) examination.

Results: A total of 221 recruited PWE underwent clinical examination. Among these, 26 (11.8 %) had cognitive impairment, and 2 had neurological signs or symptoms without cognitive impairment. Twenty-five of the 223 PWE (11.2 %) tested positive for CC, of which 4 had cognitive impairment. One hundred and ninety-eight (88.8 %) tested negative for CC, of which 22 had cognitive impairment. A total of 36 participants underwent CT scans, with 18 testing positive and 18 testing negatives for CC. Of the 36 who had CT scans, 8 (22.2 %) were diagnosed with NCC; 7 were CC positive, and 1 was CC negative; only the latter had cognitive impairment. Multivariate logistic regression confirmed that cognitive impairment in PWE was 8.62 times higher for Kongwa participants than Chunya, with a statistically significant association (95 % CI: 1.75, 156; p = 0.037). Additionally, having and education was associated with a 91 % reduction in the odds of cognitive impairment (OR = 0.09) compared to no education, which was also statistically significant (95 % CI: 0.01, 0.33; p = 0.002). There was no association between cognitive impairment and NCC.

Germany

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Conclusion: Our study found a 22.2 % prevalence of NCC among PWE. Cognitive impairment was present in 11.8 % of PWE but was not significantly associated with NCC. Socioeconomic and educational factors may play a larger role in cognitive impairment among PWE.

Keywords: *Neurocyysticercosis, Cognitive, Impairment*

1.12.2 HIV screening and associated factors among girls and young women in Tanzania: Analysis of the 2022 demographic and health survey data

Elihuruma Eliufoo[1], Linus Paul Rweyemamu[2], Tian Yusheng, Li Yamin, Theresia Ambrose Ottaru[3], Christopher Hariri Mbotwa[4]

Abstract

Introduction: Human immunodeficiency virus (HIV) infection remains a significant global challenge in resource-limited settings. Despite substantial efforts to combat HIV, the uptake of screening among adolescent girls and young women (AGYW) remains sub-optimal.

Objective: This study aimed to determine the prevalence of HIV screening and identify the factors associated with screening uptake among AGYW in Tanzania.

Methods: This was a cross-sectional analysis of the 2022 Tanzania Demographic and Health Survey (2022 TDHS). The study population included AGYW aged 15–24 years. The outcome variable was HIV screening. Modified Poisson regression analysis was used to identify factors associated with HIV screening among AGYW.

Results: A total of 5,852 AGYW with a mean age of 19.3±2.8 years were analysed. The prevalence of ever "HIV screening" was 60.2% (95% CI: 58.4–61.9). Factors associated with a higher prevalence of HIV screening included older age 20–24 years (adjusted Prevalence Ratio, aPR 1.09, 95% CI 1.04–1.15), currently or previously in marital union (aPR 1.21, 95% CI 1.15–1.27), history

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of sexual intercourse (aPR 2.32, 95% CI 2.04–2.63), pregnancy history (aPR 1.43, 95% CI 1.35–1.52), awareness of sexually transmitted infections (aPR 1.16, 95% CI 1.10–1.22), awareness of HIV testing kits (aPR 1.08, 95% CI 1.03–1.13), condom use (aPR 1.07, 95% CI 1.02–1.12), ownership of telephone (aPR 1.14, 95% CI 1.09–1.19 for non-smartphone; aPR 1.25, 95% CI 1.13–1.37 for smartphone), and visiting a healthcare facility in the previous 12 months (aPR 1.18, 95% CI 1.13–1.24). Geographically, women in the Northern and Central zones (had a lower prevalence of HIV screening compared to those in the Eastern zone.

Conclusion: The study revealed a sub-optimal prevalence of ever HIV screening among AGYW in Tanzania. Targeted interventions that address individual and interpersonal factors to improve HIV screening rates among AGYW should be implemented

Keywords: *HIV, Girls, Young, Tanzania*

1.12.3 Skin Carotenoid Scores Reflect Immune Status Among Children Living with HIV in Tanzania

Wilbert Mbuya[1],[2] Thobias Boniphace[3], Michael Mwangala[4], Peter Agrea, Nazareth M. Mbilinyi, Nancy E. Moran[5], Andrew R. DiNardo, and Mkunde Chachage

Abstract

Introduction: Many individuals living with HIV experience persistent inflammation despite effective antiretroviral treatment, increasing their risk for cardiovascular diseases, cognitive decline, and other non-communicable diseases. Carotenoids can inhibit this inflammation by reducing lipid peroxidation. Carotenoid intake and plasma concentrations can be approximated using a non-invasive cutaneous spectrophotometer.

Methods: This study quantified skin carotenoid levels in Tanzanian children aged 5–15 years (n = 185), both with and without HIV.

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Results: Over 95% had low to moderate skin carotenoid scores (<400 units). In children living with HIV, higher viral loads were linked to lower skin carotenoid scores (rho = -0.58, $p < 0.001$), while higher CD4 counts correlated with higher skin carotenoid scores (rho = 0.52, $p < 0.001$).

Conclusion: Overall, carotenoid levels were low and associated with immune status, suggesting that a high carotenoid score likely correlates with lower inflammation in children living with HIV. Future studies investigating dietary carotenoid interventions to support immune function in pediatrics are warranted.

Keywords: *Skin, HIV, Children, Tanzania*

1.13 Mkwawa University College of Education (MUCE)

1.13.1 African Extractivism and the Green Transition

Japhace Poncian[1], Richard Saunders[2], Alex Caramento, Francine Iragi Mukotanyi[3], Lyman Mlambo, Marja Hinfelaar, Jesse Ovadia, Wilma S. S. Nchito, Patience Mususa, Tumai Murombo, Abel Alfred Kinyondo, Janvier Kilosho Buraye, Chris Huggins, Anna Zalik, David Szablowski, Devyn Remme, Ben Radley, Kamala C. Kaghoma, Claude Kabemba, Sara Geenen, Mutuso Dhliwayo, Marie Rose Bashwira, Rene Loewenson

Abstract

Surging global demand for critical minerals used in renewable energy technologies represents unprecedented opportunities and challenges Southern Africa, home to substantial concentrations of these materials. Yet as Southern Africa emerges as a priority destination for miners and traders of these critical minerals, there are growing concerns in the region about the capacity of local governments to regulate the foreign-dominated industry and ensure their countries' equitable share in the benefits of critical minerals' rapid growth. Building on the insights of a multidisciplinary team of partners in place since 2018, the AEGT project studies the dynamics of critical minerals' extraction, beneficiation and regulatory innovations in four leading Southern Africa mineral exporters – the Democratic Republic of the Congo, Tanzania, Zambia and Zimbabwe. The six-year (2024-2030) project brings together political economists, anthropologists and

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3 Catholic University

sociologists, legal scholars, historians, and policy analysts and advocates from a diverse collection of research organisations, with the aim of addressing key research and knowledge gaps and supporting public debates and policy-making initiatives in Southern Africa, and beyond. The project is operationalised through four clusters, namely, Artisanal and Small Scale Mining (ASM), revenue, equity and state services, productive linkages and the infrastructures of extraction, and regional and transnational contexts of regulation. The AEGT operates through field-based research, publications, capacity building through training undergraduate, MA and PhD student researchers, conducting workshops and summer schools, and conference presentations

Keywords: *Minerals, Global, Southern Africa, Demographic*

1.13.2 The performance of Attract-and-kill approach in Managing Tuta absoluta in tomato crop during two different seasons in Iringa

Juma Mmongoyo[1], Asha Kiunga[2], Frank Dickson, Seleman Juma, Agenor Mafra-Neto[3], Fikira Kimbokota, Chaymae Fennine[4] and Teun Dekker

Abstract

Over the past century, pesticides have significantly increased food production to feed a rapidly growing population. However, their over use has caused severe environmental pollution, biodiversity loss, and human health risks. One of the most affected crops is tomato. In Tanzania, this high-value crop is heavily affected by the tomato leafminer, *Tuta absoluta*, locally known as "Kantangaze", prompting frequent insecticide applications throughout the growing season and even shortly before harvest. These practices pose serious risks to farmers, consumers, and the agroecosystem—particularly in smallholder farming systems where sustainable alternatives are under-researched, awareness of chemical toxicity is low, and regulation of produce quality and safety is limited. This research investigates the feasibility of a low-cost, sustainable alternative for managing *T. absoluta*, using an attract-and-kill strategy with the female pheromone formulated in SPLAT and combined with Spinosad as insecticide. The treatment is applied at three-week intervals (350 g/acre). The damage of *T. absoluta* is assessed on both leaves and fruits across three types of plots: pheromone-treated plots, adjacent positive control plots, and distant positive

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control plots using conventional farmer practices (i.e., heavy pesticide use). In all positive control plots, no pheromones were applied.

Our results for the dry and wet seasons of 2025-2026 show that *T. absoluta* populations are significantly lower in pheromone-treated plots, compared to positive controls. Moreover, crop damage in the pheromone-treated plots was minimal to nearly undetectable, in contrast to the other plots. Overall, the most significant outcome of this study is a tremendous reduction of tomato fruit damage for over 98%; increased production of pesticide residues-free tomatoes because no *Tuta absoluta*-pesticides were used during farming; and the increased awareness among farmers about the risks of pesticide use and their willingness to transition toward more sustainable production systems after witnessing the effectiveness of behavior-based pest management tools

Keywords: *Tomato leaf miner, pheromone, Pesticide residues, Tanzania*

1.13.3 Enhancing Adaptive Capabilities to Smallholder Farmers for Climate- Smart Agricultural Production in Semiarid Regions, Tanzania

Helena Myeya[1]

Abstract

Climate change poses significant challenges to smallholder agriculture in semi-arid areas, where livelihoods depend heavily on rain-fed farming systems. This project aims to strengthen the adaptive capacity of smallholder farmers and promote Climate Smart Agriculture (CSA) techniques to improve agricultural systems and livelihoods in selected semi-arid regions of Dodoma and Singida regions, Tanzania. This project adopts an inclusive, participatory approach integrating scientific inquiry, stakeholder engagement, and hands-on demonstrations to promote climate-smart agriculture. Success relies on carefully planned activities, including situational analysis, workshops, stakeholder meetings, training, and innovation showcases. A total of 332 smallholder famers were reached for situational analysis. Findings show that smallholder farmers face multiple climate-related vulnerabilities, including recurrent droughts, erratic rainfall, pest and disease outbreaks affecting crop yields. On testing seeds, two demonstration and two trial plots were established for seed testing in both districts by involving 120 smallholder farmers for crop and bee keeping trainings. 16 Modern bee hives were distributed to farmer groups as alternative

1 Mkwawa University College of Education

livelihood strategy in both villages. In empowering young researchers, 4 students (2 Female and 2 Male both PhD and Masters positions) have been awarded partial support on research funds. Overall, the project concludes that smallholder farmers in semi-arid areas demonstrate a strong willingness to adopt CSA, but face persistent institutional, informational, and resource-related constraints. Effective CSA interventions must therefore prioritise participatory technology testing, inclusive and practice-oriented capacity building, affordable and locally appropriate innovations, and strengthened collaboration between farmers, extension services, researchers, and community institutions. Addressing these dimensions simultaneously is essential to scale CSA adoption, enhance climate resilience, and support sustainable livelihoods in semi-arid farming systems.

Keywords: *Climate change, Smallholder, Farmers, Tanzania*

1.14 Institute of Marine Sciences (IMS)

1.14.1 Participatory Modelling for Nature-Based Solutions in the Western India Ocean Region: the Case of Mafia Island Marine Park

Daudi Msangameno[1] and Mwanahija Shalli

Abstract

The Participatory Modelling for Nature-Based Solutions in the Western Indian Ocean (PaMo-NbS) project was designed to strengthen sustainable coastal and marine resource management by integrating local ecological knowledge, scientific information and participatory decision-support tools. Implemented in Tanzania and Madagascar through collaboration among the Institute of Marine Sciences, University of Dar es Salaam, the Leibniz Centre for Tropical Marine Research, and the Institut Halieutique et des Sciences Marines, the project aimed to help decision-makers and coastal communities identify nature-based solutions for environmental, social and livelihood challenges. In Tanzania, the project focused on Mafia Island Marine Park, where participatory workshops and community validation exercises were conducted in Jibondo, Juani, Chole, Kiegeani and Marimbani villages. The approach involved stakeholder mapping, participatory mapping of resource uses and ecosystem services, identification of key challenges, and co-generation of resource and environmental management options. The results show that conflict over marine space is the central issue

1 Institute of Marine Science

affecting sustainable resource management in the study in the marine park. This conflict is driven by high dependence on nearshore resources, population increase, limited livelihood alternatives, inadequate fishing gear and technology, weak spatial planning, and non-compliance with marine resource regulations. Livelihood groups such as fishers, seaweed farmers, octopus gleaners, cowrie collectors, traders and tour operators frequently compete for the same marine areas, leading to reduced productivity, environmental degradation and social tension. The findings further reveal weaknesses in enforcement, limited community participation in tourism and conservation benefits, poor access to credit and inadequate technical knowledge for improving livelihoods. The findings demonstrates that participatory modelling and community-based mapping can provide a practical basis for integrating local knowledge into marine spatial planning, co-management and nature-based solutions. Recommended actions include institutionalizing participatory marine spatial planning, strengthening village-level governance, promoting ecosystem restoration, improving livelihood diversification and enhancing enforcement. These measures can reduce resource-use conflicts while improving ecosystem resilience, livelihoods and sustainable blue economy development.

Keywords: *Nature-Based Solutions, marine spatial planning, conflicts*

1.14.2 Marine and Coastal Operations for Southern Africa and the Indian Ocean

Kelvin Kamnde[1]

Abstract

The Marine and Coastal Operations for Southern Africa and the Indian Ocean (MarCOSIO) is a regional initiative under the GMES & Africa programme, implemented through the Institute of Marine Sciences (IMS) in Zanzibar. Focused on Zanzibar and its adjacent marine waters, the project utilizes satellite-based Earth Observation (EO) data to support sustainable management of coastal and marine resources. By integrating EO data into local and regional knowledge systems, IMS contributes to enhancing ocean monitoring, environmental planning, and resilience building across diverse user groups. MarCOSIO delivers a range of marine and coastal services relevant to key sectors such as fisheries, aquaculture, environmental conservation, marine navigation, spatial planning, and disaster risk reduction. Among the services supported by satellite data are Potential Fishing Zone (PFZ) mapping, marine weather and sea state forecasting,

1 Institute of Marine Science

ocean current and sea surface temperature analysis, and harmful algal bloom detection. The project also contributes to habitat monitoring through the mapping of coral reefs, seagrasses, and mangrove forests, and supports the identification of suitable zones for seaweed farming and mariculture. Additionally, EO data is used to generate coastal vulnerability and erosion risk maps, aiding in spatial planning and community preparedness. Data sources include satellite missions such as Sentinel-1, Sentinel-2, Sentinel-3, MODIS, VIIRS, SMOS, and Jason-3, combined with marine forecast products from CMEMS, ECMWF, and national contributions from the Tanzania Meteorological Authority (TMA). The project also collaborates with institutions such as the Deep-Sea Fishing Authority (DSFA), Zanzibar Fisheries Department, and WIOMSA for data validation and application. Through this multidisciplinary and multi-stakeholder approach, MarCOSIO enables evidence-based decision-making and supports long-term sustainability goals in Zanzibar's marine domain.

Keywords: *Earth Observation; Marine Monitoring; Coastal Management; Fisheries; Zanzibar*

2 CATEGORY 2: COLLABORATIVE RESEARCHERS WITH SUBSTANTIAL RESEARCH FUNDING

2.1 College of Engineering and Technology (CoET)

2.1.1 New Education System for Electric Access Development in Tanzania

Santos Kihwele[1],

Abstract

UMEME PROJECT is a capacity building project is between the European partners and 3 Tanzanian universities aimed precisely at strengthening and redirecting the skills of electrical engineers, based on the following cornerstones: 1. Revision of the Syllabus - to be extended on a national scale by submitting it to the specific ministerial commission - to modernize it, orient it to the needs of the energy transition (SDGs, SE4A, renewables both on a small scale / DER and hydro and solar photovoltaic and large concentration; transmission and transmission and distribution infrastructures, power quality; energy storage; energy efficiency of industrial processes; market mechanisms; interdisciplinary skills) and give greater weight to the applicative aspects that are attractive on the labor market 2. Activation of training courses for professors, researchers and professionals, with the involvement of the CIGRE, TANESCO and a number of players in the Tanzanian and international electricity industry; creation of an inter-university "Academy", at UDSM, for the continuous provision of "Advanced Short Courses" on critical issues for the electricity industry 3. Launch of facilities and laboratories with an industrial focus to enable knowledge that is not only theoretical. 4. Exchange of undergraduates, researchers and professors, both for educational purposes and to allow operational experiences in industries, Tanzanian and European, and to develop ideas and skills not otherwise acquired in an academic environment 5. Introduction of interdisciplinary skills on the sidelines of the main path of electrical engineers, with specific courses that allow them to learn how to prepare feasibility studies and financing proposals adequate to the standards of international finance, introductory courses to the SDGs and green finance for electricity sector, introductory courses to electricity markets and market-based mechanisms for decarbonisation (e.g. emission trading, carbon tax, etc.) 6. Preparation of classrooms equipped with the digital tools necessary for distance learning, at the three Tanzanian universities involved,

1 Department of electrical Engineering University of Dar es Salaam

so that the practice of distance learning can be spread to the maximum and therefore the program can easily continue even after the end of the three-year period. launch of the capacity building platform, as well as be extended to other Tanzanian universities offering electro-technical engineering courses.

Keywords: *Energy Transition, Renewable Energy, Capacity Building, Electric Power Infrastructure*

2.2 College of Natural and Applied Sciences (CoNAS)

2.2.1 Developing an Eastern Arc and Coastal Forest Biodiversity Centre for research, training, and public engagement (HAZINA)

Flora Magige[1], Simon P. Loader[2], Flora Stephano, Christoph Liedtke[3], John V. Lyakurwa, Martha D. Chiduo, Yeremia J. Chuhila, Tim Davenport[4] and Wilirk Mrosso

Abstract

The Eastern Arc Mountains and Coastal Forests of Tanzania are globally recognized biodiversity hotspots, supporting exceptional levels of species richness, endemism, and ecological significance. Despite their global importance, these ecosystems face increasing threats from habitat degradation, biodiversity loss, climate change, and growing human pressures. Effective conservation of these unique ecosystems requires strengthened scientific infrastructure, enhanced biodiversity knowledge, and improved public engagement in conservation efforts. The HAZINA Project, funded by the Hempel Foundation, is a collaborative initiative involving the Department of Zoology and Wildlife Conservation at the University of Dar es Salaam (UDSM), the Natural History Museum (United Kingdom), the Biological Station of Doñana–CSIC (Spain), and Re-Wild (USA). The project aims to establish a modern Eastern Arc and Coastal Forest Biodiversity Centre through the extensive renovation and modernization of the vertebrate wet collection museum at UDSM. The project will upgrade museum infrastructure through the acquisition of modern storage facilities, preservation systems, and collection management tools. An advanced biodiversity database

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and a dedicated project website will be developed to improve accessibility, visibility, and utilization of biodiversity collections for research, teaching, conservation planning, and public education. The Biodiversity Centre will serve as a national platform for biodiversity research, specimen preservation, scientific training, and environmental awareness. A major component of the project is capacity building and human resource development. HAZINA supports five MSc students at UDSM, each specializing in one of the major vertebrate groups: fish, amphibians, reptiles, birds, and mammals. The project has also recruited three specialized curators responsible for maintaining and expanding the vertebrate wet collection. Furthermore, university staff, students, and curators will receive advanced training in museum curation, biodiversity informatics, specimen preservation, collection management, and science communication. Training will be delivered by experts from the National Museums of Tanzania and internationally recognized institutions from the United Kingdom, Denmark, South Africa, and the United States. The project will strengthen Tanzania's capacity for biodiversity documentation, conservation research, and public engagement while establishing a sustainable centre of excellence for biodiversity science. Through international collaboration, infrastructure development, and postgraduate training, HAZINA contributes to national and global efforts to conserve biodiversity and respond effectively to environmental change.

Keywords: *Biodiversity Conservation; Eastern Arc Mountains; Coastal Forests; Natural History Collections; Biodiversity Centre; Museum Curation; Capacity Building; Public Engagement; Biodiversity Informatics; Tanzania.*

2.3 College of Social Sciences (CoSS)

2.3.1 Medical and Environmental Anthropology for 21st Century East Africa

Vendelin Simon[1]

Abstract

This collaborative NORHED II initiative brings together the University of Oslo, University of Dar es Salaam (as Global South lead), University of Nairobi, Makerere University, Maseno University, the National Institute for Medical Research (Tanzania), and the Kenya Medical Research Institute. The

1 College of Social Science

project aims to strengthen research and higher education capacity in medical and environmental anthropology across East Africa through collaborative research, postgraduate training, institutional partnerships, and knowledge exchange focused on health, environment, and social transformation. It supports the joint supervision and training of 7 PhD and 7 Master's students, alongside regional training activities, mentorship programmes, and academic exchange. By fostering collaboration across universities, research institutes, and industry-related stakeholders, the initiative seeks to strengthen applied research and enhance policy engagement in the region. In Tanzania, the project has also supported initiatives of the Tanzania Anthropological Association, contributing to the revitalization of disciplinary networks by bringing together BA Anthropology alumni and strengthening professional identity, networking, and academic development in anthropology.

Keywords: *Medical, Environment, Anthropology, Collaboration*

2.4 Dar es Salaam University College of Education (DUCE)

2.4.1 STPDM- Strengthening in-service teacher professional development and mentorship

Katherine Fulgence[1], Nicolata Chipa[2], Julius Maiyo[3], Paride Oresto Lolika[4], Perpetua Urio, Patrick Kavenuke, Betwel Oziambo, Rehema J. Mwakabenga and Florence Kyaruzi

Abstract

Effective teacher professional development is relevant for improving educational outcomes, particularly in regions facing significant challenges like Sub-Saharan Africa, aligning with Sustainable Development Goal (SDG) 4's objective of achieving quality education for all by 2030. Despite efforts by governments and development partners, existing programs often fall short in enhancing teachers'

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pedagogical skills, content mastery, and overall well-being, leading to sub-optimal teaching quality and student learning outcomes. This project aims to address these challenges through the adaptation and scaling of the School-based In-service Teacher Training (SITT) innovation, with a focus on generating and mobilizing evidence to strengthen teachers' professional development, well-being, and agency. SITT involves training college tutors to facilitate the training of teachers, who then train, coach, and mentor their fellow teachers through team teaching, model lessons, and peer learning. The project's primary objectives include enhancing pedagogical skills, content mastery, and well-being among Mathematics, Science, and Life Skills teachers to improve teaching quality and student learning outcomes in primary schools across Tanzania, Kenya, and South Sudan. The project engages various education stakeholders, including schools, teacher colleges, Local Government Authorities, communities, responsible Ministries, and Civil Society Organizations, to critically implement, monitor, and evaluate the project. Through participatory action research, the project expands and adapts the SITT model to further primary schools in Tanzania, Kenya, and South Sudan, while disseminating acquired knowledge to education stakeholders through diverse channels, including workshops, conferences, and policy dialogues at local, national, and international levels. Additionally, mechanisms for intra-stakeholder knowledge sharing will be established, spanning from Teacher Colleges to student teachers and other tutors, and from ministries to the broader community via policy reviews and Continuous Professional Development initiatives. Ultimately, the project supports government efforts of continuous professional development of primary school teachers through a well-functioning, inclusive, school-based in-service teacher training model, with a focus on Project outcomes include more effective teaching practices, skilled and empowered teachers, empowered students, and improved quality of education for children in the target regions.

Keywords: *Teacher Professional Development; School-Based In-Service Teacher Training (SITT); Teacher Mentorship and Support; Mathematics and Science Education; Life Skills Education; Teacher Agency and Well-Being; Gender Equality and Inclusion; ICT Integration*

2.5 School of Education (SoED)

2.5.1 Digitalizing School-Community Partnership as a Leadership Strategy for Strengthening School Support System in Under-resourced Schools in Tanzania

George Kahangwa; Juliana Bachilula[1], Beni Mbwile; Daudi Mrema[2], Marcellina Mjenda[3], Mr. Elias Mbwile[4]

Abstract

School-community partnerships (SCPs) are widely recognised in literature as collaborative frameworks that bring together parents, teachers, NGOs and other community actors to enhance the school support system (SSS) through providing academic assistance, psychosocial care, and material support. The partnerships function most effectively when educational leaders can intentionally organise and institutionalise partnership activities through clear roles and coordination mechanisms that deepen community contributions to schooling. In Tanzania, despite the sustained expansion of formal schooling, the country continues to experience persistent weaknesses in SSS, particularly in under-resourced schools. As such, many schools operate below minimum quality thresholds. Guided by the School-Family-Community Partnership Theory and Theory of change Frameworks, the current study delves how school leadership may leverage SCP to enhance SSS and therefore address the predicament of resource scarcity in schools. The study purpose therefore, is to promote the use of SCPs as a leadership strategy to strengthen SSS in Tanzania. Its objectives are to examine the community's willingness to support schools; assess school leaders' ability to lead SCPs for strengthening SSS; develop and apply a digital model of SCPs that can foster remote communication and mobilisation activities to strengthen SSS; and evaluate capacity building intervention and the SCP digital model application in strengthening SSS. Designed as Action research, the study entails baseline, planning to intervene, actions, analysis/evaluation and conclusions. Key education officials, school administrators and community representatives from selected districts in Songwe, Tanzania are involved.

Keywords: *Partnership in education, School support system, Digitalization, Communication, Mobilization*

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2 Mkwawa University College of Education
3 University of Dodoma
4 Tengeru Institute of Community Development

2.6 University of Dar es Salaam Business School (UDBS)

2.6.1 African Centre of Excellence for Sustainable Operations In Resource Management and Food Supply (ACESO)

Tumsifu Elly Thomas[1] and Ulingeta Mbamba

Abstract

In March 2026, the Research Project secured EUR 1.98 million grant for the period 2026–2030, equivalent to TZS 6.0 billion. The research Project is a multidisciplinary initiative advancing sustainable operations, resource management, and food supply systems in Tanzania. Activities: research undertakings, postgraduate training, thematic workshops, community engagement, international mobility, and professional development. Between December 2025 and May 2026, the project successfully completed three PhD research studies: (1) *Farmer Collaboration and the Sustainability Performance of Cashew Nut Supply Chains in Tanzania*; (2) *Green Human Resource Management and Environmental Sustainability of Manufacturing Firms in Tanzania*; and (3) *Corporate Sustainability, Board Diligence, and Financial Performance*. A fourth PhD study, (4) *Circular Economy Input–Output Dynamics in AgroSupply Chains* remains ongoing. These efforts produced three PhD graduates—two in December 2025 and one in May 2026-while the ongoing PhD continues to contribute to the project's research agenda. Two new Master's programmes MBR and SuMO-were developed, accredited by TCU, and scheduled to begin teaching in 2026. At undergraduate Bachelor of Commerce in Procurement and Supply Chain Management, graduated its first cohort in 2025. Complementing academic programmes, the project organized two student field trips annually (200 students), four guest lectures annually (250 participants), and four professional seminars annually (430 participants). Publications (1) *Farmer Collaboration and Sustainability Performance of Cashew Supply Chains*; (2) *Green HRM and Environmental Sustainability*; (3) *Corporate Sustainability, Board Diligence, and Financial Performance*; (4) *Mobile Platforms and Agricultural Success*; (5) *Health Supply Chain Effectiveness*; (6) *Mobile Platform Capabilities and Agricultural Success*; (7) *Training and Skill Development for Operations Research Professionals*; (8) *Mobile Platforms in Dodoma and Singida*; (9) *FinTech and Financial Inclusion*; and (10) *Fourth Industrial Revolution Implications for Agricultural Producers*. For five consecutive years, it has coorganized the ACOSCM, where over 60 UDSMauthored papers have been presented. 30 academic staff participated

1 University of Dar es Salaam Business School

in exchange programmes in Germany, Kenya, Ethiopia, South Africa, and Ghana. The project hosted. 40 students participated in international summer and autumn schools in Hamburg, Nairobi, and Dar es Salaam. Additionally, 45 fully funded graduate industrial internships were supported between 2024 and 2026, including 15 in 2026, and five major national consultancies were completed in logistics, clean cooking, biomass energy, and periodic surveys. Interdepartmental partnerships: CoET, School of Economics, and the Department of Botany. National collaborations: TPHPA, NM-AIST, and the UN World Food Programme. International partners include the University of Nairobi, Kuehne Logistics University, University of Ghana Business School, LEARN Logistics, and the Kuehne Foundation Climate Centre. Community engagement: Dodoma region, with the UNWFP on food supply chains, postharvest loss reduction, and value chain strengthening for sorghum and horticultural crops, engaging over 700 households. The alternative cooking energy, involving households across Arusha, Manyara, Shinyanga, Simiyu, Singida, Kigoma, and Dodoma, reaching more than 2,000 households and delivering over 150 community workshops and dissemination sessions. Looking forward from 2026, the project will expand its impact through six additional fully funded Master's scholarships, two additional PhD scholarships, continued community workshops, joint research and publications, staff and student exchanges, TrainingofTrainers programmes, and professional seminars. The project will also organize international conferences to position UDSM as a regional hub for academic dialogue and global engagement, and will institutionalize cosupervision and collaborative teaching across partner universities to strengthen academic standards and interdisciplinary collaboration.

Keywords: *Sustainability, Food supply, Resource Management, Tanzania*

2.7 University of Dar es Salaam School of Economics (UDSE)

2.7.1 Supporting Youth to accelerate Just Transition to Clean energy and Climate Energy and Climate-resilient Business

Jehovanes Urassa Aikaeli [1] and Beatrice Mkenda [2]

Abstract

This is an action research project supporting youth-led micro, small and medium enterprises (YMSMEs) to accelerate a just transition to clean energy and climate-resilient businesses in Tanzania and Uganda. Consistent with the action research tradition, it does not merely study the transition but actively intervenes in it, cycling between investigation, action, reflection, and adaptation while documenting every activity and emerging issue. Motivated by the fact that youth comprise Africa's largest population group, with about 70% of sub-Saharan Africans under the age of 30 and MSMEs contributing roughly 30 to 40% of GDP while relying heavily on charcoal, firewood, and fossil fuels, the project combines knowledge enhancement, practice improvement, policy advocacy, and capacity building under a gendered, theory-of-change approach implemented across five iterative phases. The research adopted a baseline-to-mentorship design in which mentorship is the central intervention. It began with secondary analysis and primary surveys to identify candidate enterprises. In Tanzania, the team initially interacted with 124 YMSMEs in the Ilala and Kinondoni districts of Dar es Salaam and explored the World Bank Enterprises Survey (2023) and the National Bureau of Statistics Informal Sector dataset, which yielded about 96 enterprises and 47 potential mentees but proved unsuitable due to missing contacts, GPS locations, and age and gender breakdowns. Reflecting an adaptive, problem-solving stance, the team consequently generated its own primary data, surveying 100 food and beverage enterprises in February 2025. In Uganda, a mapping of 200 youth-led food and beverage businesses, of which 64.5% were female-owned, provided a sampling frame for a baseline survey of 80 enterprises. Action learning from stakeholder interactions prompted the project to expand its scope from food processing alone to the youth-dominated motorcycle and tricycle transport sector, given its high emissions and the emergence of electric alternatives. Mentees were selected on age, gender, and commitment to change, and were matched with mentors drawn from public, private, and development partner stakeholders in a co-produced process. By January 2026, measurable transitions had emerged from the intervention.

1 School of Economics, University of Dar es Salaam,
2 School of Economics, University of Dar es Salaam.

In the food and beverage sector, 21 mentees were drawn from 50 applicants, and 11 had already switched from charcoal stoves to liquefied petroleum gas, comprising four women and seven men. In the transport sector, 30 mentees were engaged, of whom four had transitioned to electric tuk-tuks with CRDB Bank financing, while an additional WATU Credit facility is expected to enable at least 15 transitions. Twelve mentors, including equipment suppliers, financiers, government technocrats, and UNDP, supported the cohort. In conclusion, the action research demonstrates that youth enterprise transition to clean energy is feasible but constrained by data limitations, financing barriers, and the high cost of electric vehicles. Key recommendations include expanding access to credit and clean energy technologies, strengthening mentor and financier partnerships, mainstreaming gender inclusion, and sustaining policy engagement and dissemination to scale up adoption

Keywords: *Clean Energy Transition, Youth Entrepreneurship, Climate-Resilient Businesses*

2.8 Mkwawa University College of Education (MUCE)

2.8.1 ADVANCE: Advancing Social Innovation and Entrepreneurship through Postgraduate Education in East Africa

Deusdedit A. Rwehumbiza[1], Chacha S. Chacha, Selina T. Mkimbili, Cornel J. Mlacha, and Hamidu Seki

Abstract

The Advancing Social Innovation and Entrepreneurship through Postgraduate Education in East Africa (ADVANCE) Project (Project No. 101178404) is a three-year Erasmus+ Capacity Building in Higher Education initiative funded by the European Union and implemented from 1 November 2024 to 31 October 2027. With an estimated budget of approximately TZS 3 billion, the project aims to strengthen social innovation and entrepreneurship education in East Africa through competence-based curriculum development, institutional capacity building, and enhanced university-industry collaboration. The project is implemented by a consortium of ten partner institutions from Tanzania, Uganda, Bulgaria, Lithuania, and Italy, comprising seven universities and three non-university organizations. The university partners include Mkwawa University College of Education (MUCE) and Mzumbe University (MU) from

1 Mkwawa University College of Education

Tanzania; Busitema University (BU) and Lira University (LU) from Uganda; the University of National and World Economy (UNWE) from Bulgaria; Vilniaus Kolegija (VIKO) from Lithuania; and the University of Sannio (UNISANNIO) from Italy. The non-university partners are the Small Industries Development Organization (SIDO) of Tanzania, the Forum for African Women Educationalists and Participatory Development (FAPAD) of Uganda, and Tetra Solutions (TETRA) of Bulgaria. The project addresses the growing demand for innovative educational approaches capable of equipping graduates with competencies to address pressing social, economic, and environmental challenges in East Africa. Using a rigorous mixed-methods research design, the project conducted a comprehensive needs assessment involving 212 participants from Tanzania and Uganda, including academics, social entrepreneurs, graduate students, ecosystem enablers, and development practitioners. The findings revealed expanding social entrepreneurship ecosystems in East Africa and identified seventeen core competencies required by social entrepreneurs. These competencies were grouped into three major domains: Ideas and Opportunities, Resources, and Into Action, providing a strong empirical foundation for curriculum development. Building on these findings, the project has successfully developed a Competence-Based Postgraduate **Diploma in Social Innovation and Entrepreneurship**, designed to be delivered through a blended learning approach integrating experiential learning, mentorship, community engagement, and real-world problem-solving. The proposed curriculum has been submitted to the Tanzania Commission for Universities (TCU) for accreditation and approval.

To enhance institutional readiness for programme implementation, the project has undertaken two major international capacity-building programmes for project teams and prospective programme facilitators. The first training was conducted in Italy in May 2025, while the second was held in Uganda in April 2026. Furthermore, the project has supported the establishment of a Hybrid Teaching and Learning Studio (Smart Classroom) at Mkwawa University College of Education to facilitate technology-enhanced and blended programme delivery. As part of its dissemination strategy, the project is currently developing a scholarly article for publication to share emerging findings and best practices in social entrepreneurship education. Through its collaborative regional and international partnerships, the ADVANCE Project is expected to contribute significantly to the transformation of postgraduate education in East Africa by strengthening institutional capacities, fostering university-industry linkages, nurturing social innovation ecosystems, and producing graduates equipped to develop sustainable solutions to societal challenges.

Keywords: *Social Innovation, Social Entrepreneurship, Competence-Based Education, Postgraduate Diploma, Capacity Building, Erasmus+, East Africa, Blended Learning, Curriculum Development, University-Industry Collaboration*

2.9 Institute of Marine Sciences (IMS)

2.9.1 Enhancing Resilience of Coastal Communities: Towards Sustainable Fisheries and a Healthy Marine Environment (ECOFISH)

Margareth S. Kyewalyanga[1], Mwanahija Shalli, Aviti Mmochi, Sarah Osima[2], Martin Stendel[3], Torkel Gissel Nielsen[4], Alistidia P. Mwijage, Brian MacKenzie and Thilde Langevang

Abstract

Climate change, pollution and over-exploitation are threatening fisheries-related livelihoods and food security in Tanzania to the extent that may undermine national efforts to attain the Sustainable Development Goals (SDGs). The marine resources in the Tanzanian coastal zone support the livelihoods of more than 25% of Tanzanians and contribute about 30% of the national GDP. Finding potential solutions to the situation is hampered by knowledge-gaps spanning from climate projections to socio-economics. The ECOFISH project aims at filling some of these gaps and thus, contribute to enhancing the resilience of the coastal communities, sustainability of fisheries and strengthen the research capacity and collaboration in the field. Through a multi-disciplinary approach, ECOFISH will provide new understanding of mechanisms, processes and linkages between climate, pollution, lower trophic levels, fisheries and coastal livelihoods in a tropical coastal area, which is currently not available. Specifically, the objectives of ECOFISH are 1) to reduce the threats that climate change and pollution pose to marine biodiversity, ecosystem functions and fisheries-related livelihoods, 2) to enhance the resilience of coastal communities for climate-induced weather changes, 3) to improve the sustainability and productivity of fisheries and 4) to strengthen the research capacity, ocean literacy and regional

1 University of Dar es Salaam, Institute of Marine Sciences (IMS)
2 Tanzania Meteorological Authority (TMA)
3 Danish Meteorological Institute, The National Centre for Climate Research
4 Technical University of Denmark, National Institute of Aquatic Resources

research collaboration within fisheries and marine science. The outcomes of the project will provide miniature for other regions facing similar challenges, aligning with national and regional commitments to marine conservation and the blue economy.

Keywords: *Coastal communities, sustainable fisheries, health Marine environment.*

3 CATEGORY 3: DISTINGUISHED RESEARCHER OF THE YEAR

3.1 College of Agricultural Sciences and Food Technology (CoAF)

3.1.1 Academic Profile: Dr. Charles Olambo Joseph

Dr. Charles Olambo Joseph is a Senior Lecturer (since 2022) and Head of the Department of Crop Sciences and Beekeeping Technology at the University of Dar-es-Salaam's College of Agriculture and Food Technology (CoAF). He holds a PhD in Agriculture from the Chinese Academy of Agricultural Sciences (2015), and an MSc in Agronomy from Huazhong Agricultural University, China (2010), following a BSc in Food Science and Technology from Sokoine University of Agriculture (2005). With over 15 years of applied agricultural research experience, his expertise spans agronomy, climate-resilient crop production systems, molecular breeding, water use efficiency, biostimulants, and farmer-oriented technology dissemination. He teaches undergraduate courses including Cell and Molecular Biology, Genetics, Biochemistry, and Breeding and Biotechnology, and postgraduate courses in Applied Genetics, Soil-Water-Crop Systems, and Research Methods. He has successfully supervised 13 defended postgraduate students (5 PhD and 8 MSc) and currently mentors 5 PhD candidates in areas ranging from potato and rice breeding to sweet potato IPM, rice bacterial blight management, and clove genetic characterization. Dr. Joseph has led and contributed to major international research projects, including the Green Super Rice (GSR) initiative with the Chinese Academy of Agricultural Sciences, IRRI, and the Gates Foundation, which developed over 80 climate-resilient rice varieties for 18 countries. He serves as Work Package Leader for the EU-funded East African HEI Network for Digital Plant Pathology (2024–2027), Co-PI for a COSTECH-Norway project on agricultural biologicals for smallholders (2023–2027), and researcher on COSTECH projects on fortified soy-moringa foods and banana productivity, as well as a team member of the SIDA-UDSM bilateral food security programme (2024–2028). He has also been Principal Investigator on multiple UDSM competitive research grants focusing on water use efficiency in rice and efficacy of agribiologicals. His collaborative research spans TARI centers, IITA, and IRRI, covering varietal performance, genetic diversity, mutation breeding, and agronomic practices across rice, maize, sunflower, cassava, sesame, sweet potato, potato, cashew, and banana. Dr. Joseph has authored or co-authored over 32 peer-reviewed publications up to May 2026 in journals such as BMC Plant Biology, Frontiers in Agronomy, Field Crops Research, and Agricultural water management, covering yield improvement, stress tolerance, nutrient use efficiency, pest and disease

management, film mulching, and biostimulant applications. In the period since the previous Research and Innovation Week (RIW), Dr. Joseph has published a total of 17 journal papers in various reputable outlets published by Springer, Elsevier, Wiley and UDSM. Dr. Joseph has also served as Examination Officer (2020–2022), Internal Independent Examiner, and lead accreditor for the Inter-University Council for East Africa (IUCEA) at universities in Zambia and Malawi, and has reviewed over 15 manuscripts for the Tanzania Journal of Sciences and five for Springer journals. His outreach includes working with extension officers on cotton pesticide compliance in Kilosa, water management at Lumuma irrigation scheme, and technology adoption studies on sesame, sunflower, cassava, and potatoes across several Tanzanian regions. Dr. Joseph is committed to translating research into practical, climate-smart solutions for smallholder farmers, fostering sustainable agricultural development and food security in Tanzania and beyond.

3.2 College of Engineering and Technology (CoET)

3.2.1 Academic Profile: Dr. Jackson Justo

Dr. Jackson Justo is an academic staff at the Department of Electrical Engineering (EE Dept.), College of Engineering and Technology (CoET), University of Dar es Salaam (UDSM), Tanzania. He holds a Ph.D. in Electrical and Electronics Engineering from Dongguk University, South Korea, and completed a two-year postdoctoral fellowship at the University of Pretoria, South Africa. He is also a recipient of a Prestigious Senior Research Fellowship at ITMO University, St. Petersburg, Russian Federation. Dr. Justo leads the NIPSET Research Group (NextGen Intelligent Power and Energy Systems), spearheading the Just Energy Transition Initiatives at the EE Department. His research focuses on power electronics, microgrids with renewable energy resources, intelligent control systems (fuzzy logic, neural networks, Model Predictive Control), EV charging infrastructures, wireless power transfer for UAV and underwater vehicles, and industrial automation. He also serves as Editor-in-Chief of the Tanzania Journal of Engineering and Technology, Associate Editor for IET Renewable Power Generation, has served as Adjunct Professor at Woxsen University (India), and is an External Examiner at Dar es Salaam Institute of Technology (DIT), Nelson Mandela African Institute of Science and Technology (NM-AIST), Cape Peninsula University of Technology (CPUT, South Africa), and St. Joseph University (Tanzania). He was named Best Researcher at UDSM (2018) and Best Innovator of the Year at CoET (2021, 2022). He has also completed specialized IP and patent drafting training

organized by the Japan Patent Office (JPO), COSTECH, and UDSM. Dr. Justo has served as Principal Investigator or Co-Investigator on multiple projects funded by UDSM, COSTECH, the European Union, and the University of Cambridge. His consultancy work includes national energy master plans, small-hydro power projects, and rural microgrids for TANESCO, VEDA Limited, and the Tanzania Forest Agency. He has authored/edited books with Elsevier, CRC Press, Springer, and IGI Global, and published in highly reputable journals and international conferences. Moreover, he holds granted patents in Tanzania and has been a mentor and supervisor for early-career researchers, Ph.D., MSc., and undergraduate students. He is a professional member of IEEE, TAREA, and the ERB (Tanzania).

3.3 College of Humanities (CoHU)

3.3.1 Academic Profile: Prof. Michael Andindile

Prof. Michael Andindile is an Associate Professor in Anglophone Literary and Postcolonial Studies. He holds an MPhil/PhD in English from Fordham University, New York; an MA in International Journalism from City, University of London; an MA in Information Studies and a BA from the University of Dar es Salaam (in English, Linguistics and Literature); a Diploma in Journalism from the Evelyn Hone College in Lusaka, Zambia. He has previously served as Dean of the University of Dar es Salaam's School of Journalism and Mass Communication (SJMC) for two triennia. Moreover, Prof. Andindilile had also worked as the Chief Sub-Editor for the Tanzania Daily News and as a reporter for the Times of Zambia. Besides teaching literature courses at both undergraduate and postgraduate levels and supervising doctoral students, he also serves as the Editor of Umma: The Journal of Contemporary Literature and the Creative Arts, jointly run by the departments of Literature and Creative Arts of the University of Dar es Salaam. In addition to numerous articles on Anglophone African literatures, he has also published a book entitled The Anglophone Literary Linguistic Continuum: English and Indigenous Languages in African Literary Discourse (African Humanities Book Series, NISC: Grahamstown, SA, 2018).

3.4 College of Information and Communication Technologies (CoICT)

3.4.1 Academic Profile: Prof. Kwame Ibwe

Prof. Kwame Ibwe is an Associate Professor at the College of Information and Communication Technologies (CoICT), University of Dar es Salaam (UDSM),

Tanzania, with extensive academic, research, consultancy, and leadership experience in telecommunications engineering, wireless communication systems, digital signal processing, networking technologies, and emerging ICT applications for sustainable development. His research interests span across 5G and Beyond (6G) communication systems, massive MIMO systems, beamforming optimization, wireless sensor networks, Internet of Things (IoT), smart grid communication systems, integrated sensing and communication (ISAC), digital signal processing, machine learning applications in communication systems, and ICT4D initiatives. His recent work has particularly focused on optimization-based approaches for dense wireless communication environments, intelligent network slicing, compressed sensing techniques, and advanced waveform design for future wireless systems[1]. Prof. Ibwe has played a leading role in several large-scale national and international ICT and digital transformation initiatives. He has been actively involved in the implementation and coordination of the Higher Education for Economic Transformation (HEET)[2] Project under the World Bank-supported higher education modernization program at the University of Dar es Salaam. His contributions have focused on digital infrastructure transformation, smart campus technologies, enterprise systems integration, high-capacity network deployment, cloud and storage systems, and digital learning ecosystems. He has also contributed significantly to the iGRID project and several institutional digitalization initiatives aimed at strengthening ICT infrastructure, innovation ecosystems, and research capacity within higher learning institutions and partner organizations. In addition, Prof. Ibwe served as a senior ICT consultant and technical advisor for Imagine Worldwide Tanzania[3], where he oversaw ICT deployment strategies, digital learning platforms, connectivity solutions, and large-scale educational technology implementations supporting foundational learning through OneCourse digital learning systems. Prof. Ibwe has supervised more than 25 postgraduate students at Masters and PhD levels, as well as over 150 undergraduate research projects throughout his academic career. He has published more than 40 peer-reviewed scientific papers in reputable international journals and conferences. In addition to his research and teaching contributions, Prof. Ibwe is an active reviewer for numerous high-impact international journals and conferences including IEEE Transactions on Education, IEEE Access, Discover Applied Sciences, Journal of Electrical Engineering and Information Systems (JESI), and Scientific Reports, among others

1 https://scholar.google.com/citations?user=vs1QagsAAAAJ&hl=en
2 https://heet.udsm.ac.tz/
3 https://www.imagineworldwide.org/our-work/tanzania/

3.5 College of Natural and Applied Sciences (CoNAS)

3.5.1 Academic Profile: Dr. Makungu Madirisha

Dr. Makungu Madirisha is a Senior Lecturer and Materials Chemist in the Department of Chemistry, College of Natural and Applied Sciences (CoNAS), at the University of Dar es Salaam (UDSM). He specializes in sustainable materials chemistry, with particular expertise in geopolymers and alkali-activated materials. He holds a Bachelor of Science with Education (Chemistry and Physics) from the University of Dar es Salaam, a Master of Science in Chemistry from the University of Nairobi, and a PhD in Oil, Gas, and Geothermal Chemistry from the University of Twente, the Netherlands. Dr. Madirisha has established himself as one of the leading researchers in sustainable materials chemistry, with a growing international reputation in the development of low-carbon materials and resource-based technologies. His research focuses on transforming locally available minerals, industrial by-products, and agricultural residues into innovative technologies that address challenges in infrastructure development, clean water access, energy, environmental sustainability, and industrial transformation. Through his flagship initiative, *Transforming African Resources into Sustainable Technologies through Chemistry-Driven Innovation*, he has developed several technologies, including Duracem low-carbon construction materials, Duracem 1A stabilized cold-mix asphalt technology, Novacem multifunctional construction materials, FluoroGuard fluoride-removal systems, BentoX-TZ drilling and sealing materials, Fluxen biogas upgrading technology, GeoCatalytic pollutant degradation systems, and low-emission coal briquette technologies. Several of these innovations have progressed beyond laboratory development and are currently undergoing field piloting and industrial validation through collaborations with public and private sector partners. His international research profile has been strengthened through fellowships and collaborations with institutions including the University of Gothenburg (Sweden), the University of South Africa, and the University of Toulouse (France) under the prestigious Make Our Planet Great Again (MOPGA) Fellowship Programme. He has also established active research collaborations with leading institutions in Belgium, Denmark, France, Germany, the United States, South Africa, Namibia, and the Czech Republic. Between May 2025 and May 2026, Dr. Madirisha published fourteen (14) peer-reviewed scholarly outputs in reputable international journals and book series indexed in Scopus and Web of Science. His publications cover topics including geopolymer technologies, sustainable construction materials, circular economy solutions, nanomaterials, environmental remediation, hydrogen storage systems, green electronics, and advanced cementitious materials. As of 2026, his scholarly work has attracted

more than 492 citations and an h-index of 11, reflecting the growing impact of his research within the global scientific community. In addition to his scientific publications, Dr. Madirisha has developed seven draft patents, demonstrating the innovation and commercialization potential of his research. He has also contributed significantly to capacity building through the supervision and mentorship of undergraduate and postgraduate students in chemistry, materials science, and engineering-related disciplines, while promoting interdisciplinary research, innovation, and academia–industry collaboration. Dr. Madirisha currently serves as an Academic Editor for PLOS ONE and as a reviewer of researcher portfolios for the National Research Foundation (NRF) of South Africa. He is also an active reviewer for numerous international journals published by Elsevier, Springer Nature, Wiley, and Taylor & Francis. He is a member of the Tanzania Chemical Society (TCS), the Tanzania Geological Society (TGS), and the Nordic Biochar Network. Through research excellence, innovation, mentorship, and international collaboration, Dr. Madirisha continues to advance sustainable materials chemistry and develop practical technologies that contribute to industrial development, environmental sustainability, and socio-economic transformation in Tanzania, Africa, and beyond.

3.6 Dar es Salaam University College of Education (DUCE)

3.6.1 Academic Profile: Dr. Almas Fortunatus Mazigo

Dr. Almas Fortunatus Mazigo is a Senior Lecturer in Applied Ethics and Development Evaluation at the Dar es Salaam University College of Education (DUCE), University of Dar es Salaam. His research demonstrates outstanding scholarly productivity, innovation, international visibility, and measurable societal impact. During 2025–2026, he produced ten high-quality scholarly publications in internationally recognized outlets, including *Discover Sustainability*, *Local Environment (Taylor & Francis)*, *the Journal of Sustainable Business*, *the Asian Pacific Journal of Evaluation*, *Springer International Handbooks*, *the African Evaluation Association's Handbook on Made in Africa Evaluation*, and *the LIEPP Methods Brief Series* of Sciences Po, France. His Google Scholar profile shows 46 citations and an h-index of 3, reflecting growing academic visibility and use of his research. Dr. Mazigo's work has advanced knowledge in sustainability, development ethics, governance, climate resilience, and evaluation through original contributions, including the development of a Southern Theory of Corporate Social Responsibility Transformation and the Swahili Evaluation Approach, an indigenous evaluation framework that is contributing to global debates on culturally responsive and decolonized evaluation. Beyond scholarly

outputs, his research has generated tangible community benefits through participatory climate action initiatives in coastal Tanzania, including coral reef and mangrove restoration, and has informed curriculum innovation, policy engagement, professional training, and institutional capacity development. During 2025–2026, the quality and impact of Dr. Mazigo's research were further recognized through several prestigious awards and competitive international grants and fellowships from organizations including the British Academy, the International Development Research Centre (IDRC), the African Evaluation Association (AfrEA), the Africa Gender and Development Evaluators Network (AGDEN), and the French Embassy in Tanzania. He also received an Eval Indigenous Certificate of Achievement for outstanding participation in global Indigenous evaluation initiatives. At the institutional level, he was voted the Departmental Best Worker and the Overall College Best Worker (2025/2026) at DUCE, and received a Certificate of Excellence and a Monetary Prize in recognition of outstanding achievements in academic publications, research, and innovation. In addition, he received the Distinguished Researcher of the Year Award at DUCE, further affirming the quality, relevance, and impact of his scholarly contributions during the assessment period

3.7 Institute of Resource Assessment (IRA)

3.7.1 Academic Profile: Prof. Nobert Joel Kirway

Prof. Nobert Joel Kirway is a distinguished Tanzanian academic, researcher, and water resources specialist currently serving as the Director of the Institute of Resource Assessment (IRA) at the University of Dar es Salaam. He is also a teaching in the Department of Water Resources Engineering, where he has made significant contributions to teaching, research, consultancy, and capacity building in water resources management, hydrology, climate change adaptation, and environmental sustainability. Prof. Nobert holds a Bachelor of Science in Civil Engineering, a Master of Science in Water Resources Engineering from the University of Dar es Salaam, and a Doctor of Philosophy (PhD) in Water Resources Engineering from Yokohama National University. His academic training has provided a strong foundation for his extensive work in hydrological modelling, integrated water resources management, watershed management, and environmental assessment. Throughout his academic career, Prof. Nobert has held several leadership positions, including Head of the Department of Water Resources Engineering and Director of the Institute of Resource Assessment. He has played a key role in advancing interdisciplinary research and policy engagement on natural resources management, climate resilience,

and sustainable development in Tanzania and beyond. His research interests focus on Hydrological modelling and simulation; Water resources planning and management; Integrated Water Resources Management (IWRM); Watershed and river basin management; Climate change impacts and adaptation; Groundwater and surface water assessment; Environmental Impact Assessment (EIA); GIS and Remote Sensing applications in water resources management. Prof. Nobert has participated in numerous national and international research projects and consultancy assignments. He has contributed to the development of Integrated Water Resources Management and Development Plans for several river basins in Tanzania and has served as an expert advisor in transboundary water resources management initiatives. He has also worked extensively with government agencies, development partners, and regional organizations on water allocation, flood forecasting, climate adaptation, and sustainable natural resources management. As a scholar, Prof. Nobert has authored and co-authored numerous peer-reviewed journal articles, technical reports, book chapters, and conference papers. His publications cover diverse topics including hydrological modelling, groundwater potential mapping, land-use and land-cover change, flood risk assessment, water allocation, climate variability, and river basin management. His scholarly work has attracted substantial academic recognition, with more than 60 scientific publications and hundreds of citations in international literature. In addition to his academic and research contributions, Prof. Nobert is a registered Professional Engineer and Environmental Expert. He has actively supported national development initiatives through consultancy services, environmental assessments, and technical advisory roles in major infrastructure and water resources projects. His work has significantly contributed to evidence-based decision-making in water governance, environmental management, and climate resilience in Tanzania

3.8 Mbeya College of Health and Allied Sciences (MCHAS)

3.8.1 Academic Profile: Dr. Bernard Ngowi

Dr. Bernard Ngowi is an internationally recognized researcher whose work has advanced the fields of neurocysticercosis, neglected tropical diseases, parasitic zoonoses, infectious diseases, and HIV co-infections. His research has contributed significantly to improving the diagnosis, management, and understanding of neuroinfectious diseases and epilepsy in low-resource settings, particularly in Tanzania and Sub-Saharan Africa. Through international collaborations, he has contributed to regional and global efforts addressing neglected tropical diseases and strengthening public health research and

interventions. His research leadership extends to international collaborative initiatives on neurocysticercosis, taeniosis, schistosomiasis, and soil-transmitted helminth infections. Dr. Ngowi is a member of several distinguished scientific organizations and research consortia, including the World Health Organization Collaborating Centre of Excellence for Neglected Tropical Diseases at the University of Gent Belgium, the Medical Association of Tanzania, the Afrique One REACH, the East African Consortium for Clinical Research, and the Cysticercosis Network of Sub-Saharan Africa. a WHO Expert Consultant for the Management of Neurocysticercosis. These memberships demonstrate his active engagement and leadership in international scientific and public health initiatives. Dr. Ngowi has also secured major international research grants that contribute substantially to institutional research capacity and global health innovation. He is a Principal Investigator of the "Implementation of Superior Treatment Regimen and Improved Patient Pathway for Neurocysticercosis in Sub-Saharan Africa (NeuroSolve)" project funded by the European Union through EDCTP3JU, with a total grant of 1.6 million Euros (2023–2027). He is also leading the "Integrated Anthelmintic-Based Control of Taenia solium Cysticercosis/Taeniasis, Soil-Transmitted Helminthiasis and Schistosomiasis" project funded through HORIZON-JU-GH-EDCTP3-2024-01, valued at 4 million Euros (2025–2029). These projects strengthen international collaboration, research infrastructure, and disease control efforts across Sub-Saharan Africa. These two projects have lead to establishment of NeuroSolve Consortium and the 3SI Control Consortium respectively, both involving major institutions from Africa and Europe working to strengthen research, disease control, and healthcare responses for neglected tropical diseases. Through these grants, Dr. Ngowi is actively contributing to capacity building by supporting the training of four PhD students and three Master's students across the University of Dar es Salaam, Kilimanjaro Christian Medical University College (KCMUCo), and the University of Dodoma. In addition, he has supported the establishment of a dedicated server at UDSM-MCHAS that hosts research data collected through REDCap, strengthening data management systems, secure storage, and research efficiency within the institution. Dr. Ngowi has published extensively in high-impact journals, with 2,279 citations, an h-index of 23, and an i10-index of 39. Since the 10th Research and Innovation Week, Dr. Ngowi has co-authored nine peer-reviewed publications, including seven papers in Q1-ranked journals such as Frontiers in Immunology, BMC Infectious Diseases, PLOS Neglected Tropical Diseases, and Tropical Medicine and Infectious Disease. His publications continue to generate important evidence on neurocysticercosis, immune responses, COVID-19 vaccination, tuberculosis treatment outcomes, and health research systems, contributing substantially to scientific advancement and public health practice nationally and internationally.

3.9 Mkwawa University College of Education (MUCE)

3.9.1 Academic Profile: Dr. Chakupewa Mpambije

Dr. Chakupewa Mpambije is a Senior Lecturer in Development Studies and Public Health specializing in health systems strengthening, maternal and child health, decentralization of health services, health policy analysis, and social protection. Currently, he serves as the Director of Public Service and Outreach Programmes at Mkwawa University College (MUCE), a constituent college of the UDSM. His prominent scholarship is vivid through impactful research, teaching, consultancy, and community engagement. He has authored 38 peer-reviewed articles published in reputable local and international journals, contributing to the strengthening of health systems, improved maternal and child health outcomes, and social protection interventions. During the 2025/2026 academic year alone, he has published 12 articles in peer-reviewed journals, with four published by Springer, three by Elsevier, one by Taylor & Francis, one by Wiley, and one by UDSM serving as lead author on four publications and as the corresponding author on four others. As of June 2026, his research outputs have garnered 415 citations according to Google Scholar, with an *h*-index of 10 and an i10-index of 11. He maintains active profiles on ORCID, Scopus, and ResearchGate, thus maintaining visibility within the global academic community. Dr. Mpambije's research contributions stem from more than eleven projects, in which he has served as Principal Investigator in four, Co-Investigator in five, and Researcher in two. Currently, he is involved in five ongoing projects, including: *(i)* Enhancing Social Protection and Poverty Reduction through Conditional Cash Transfers in Tanzania, funded by Oxford Policy Management; *(ii)* Composting of Disposable Diapers: Empowering Women on Management for Economic and Environmental Health Improvement, funded by UDSM; *(iii)* Closing the Financial Inclusion Gender Gap to Unlock Women's Entrepreneurial Capacity in Tanzania, funded by REPOA; (iv) Assessing the Effectiveness of Iron and Folate-Rich Foods in Reducing Anaemia among Pregnant Women in Bukoba Municipality, funded by ESRF; and (v) Climate Change and Food Security Nexus in Tanzania: Enhancing Smallholder Farmers' Adaptation Strategies in Dodoma Region, funded by UDSM. Dr. Mpambije has made substantial contributions to improving community livelihoods through outreach programs, capacity-building initiatives, and evidence-based policy engagement. His efforts have strengthened health systems and improved community access to antenatal care services via training, advocacy, and public intervention initiatives. On the international stage, Dr. Mpambije has actively participated in thirteen international conferences, presenting research papers and policy-relevant evidence. Additionally, he co-authored an accepted policy

brief titled "*How Can PSSN Programmes Effectively Reduce Multidimensional Poverty? Lessons from Tanzania,"* to be published by the Deep Challenge Fund. His research performance has earned him several accolades, including the best impactful researcher during the 7th UDSM Research and Innovation Week in 2022 College level, the best multidisciplinary research project in 2022, and second winner for the best researcher of the year during the 8th Research and Innovation Week at MUCE in 2023. Dr. Mpambije has also engaged in consultancy and collaborative research projects with organizations such as REPOA, ESRF, SIKIKA, IDRC-Canada, DFID-United Kingdom, the Christian Social Services Commission (CSSC), and Oxford Policy Management. He serves as an external examiner for the Mwalimu Nyerere Memorial Academy, the University of Iringa, and the University of Dodoma. He also supervises three PhD students, has supervised one master's student who has completed, and is currently supervising three Master's students. He is an active member of the Tanzania Development Studies Association (TDSA) and the Tanzania Public Health Association (TPHA). Additionally, Dr. Mpambije serves on the editorial boards of the Tanzania Journal of Community Development as well as reviewer for the Health Policy Open Journal (published by Elsevier), the International Journal of Health Policy and Management (published by Wiley), and the Journal of Humanities and Social Sciences, DUCE.

3.10 School of Education (SoED)

3.10.1 Academic Profile: Prof. George Kahangwa

Prof. George Kahangwa is an Associate professor in Educational Management and Policy Studies at the University of Dar es Salaam (UDSM), Tanzania where he has been working since January 2007. He holds a PhD in Education from the University of Bristol, UK.; Master of Arts in Education and Bachelor of Arts with Education from UDSM. He has researched and published widely on international and local issues that influence education policy making and educational planning and provision as well as practices in research research. He also has been involved in several consultancies that include development of policy and plans for education, policy reviews, frameworks, and strategies as well as facilitating continuous professional development for educators. He currently serves as the Head of Educational Foundations, Management and Lifelong Learning department, at UDSM School of Education. Prof. Kahangwa's outstanding performance in research and innovation has been recognised through several prizes including University of Dar es Salaam Second Winner in attracting Innovation fund (2022), School of Education Researcher of the year (2021 and 2022) and overall second winner in public service at UDSM in 2018.

3.11 University of Dar es Salaam Business School (UDBS)

3.11.1 Academic Profile: Prof. Omari Khalifa Mbura

Prof. Omari Khalifa Mbura is an Associate Professor of Marketing, and Management at the University of Dar es Salaam Business School (UDBS). He is one of Tanzania's leading scholars in entrepreneurship development, marketing, business networking, small and medium enterprise (SME) development, strategic management, customer relationship management, tourism marketing, and organizational development. With over three decades of experience in teaching, research, consultancy, and community service, Prof. Mbura has made significant contributions to academic scholarship and business practice in Tanzania and beyond. Prof. Mbura's research career has focused on entrepreneurship, marketing, business development services, entrepreneurial networks, innovation, customer relationship management, social media marketing, tourism enterprises, banking services, and SME internationalization. His pioneering work on entrepreneurial networks and marketing information accessibility among small-sized enterprises has contributed substantially to understanding how business networks enhance enterprise competitiveness and growth in developing economies. To date, Prof. Mbura has authored and co-authored more than 35 peer-reviewed journal articles published in reputable national and international journals, including *Business Management Review*, *Tanzania Journal of Development Studies*, *Tanzania Economic Review*, *International Journal of Training and Development*, *Journal of Entrepreneurship in Emerging Economies*, *The Bottom Line*, *Cogent Business & Management*, *African Journal of Economic Review*, and *Journal of Global Entrepreneurship Research*. His research outputs have addressed contemporary issues such as entrepreneurship training transfer, entrepreneurial orientation, digital marketing, tourism enterprise performance, women entrepreneurship, banking sector performance, healthcare innovation, and SME competitiveness. In addition to journal publications, Prof. Mbura has authored and contributed to several books and book chapters. His notable books include *Marketing, Customer Services and Business Ethics* (2004), *Entrepreneurship and Small Business Development in Tanzania* (2013), and *Principles of Marketing and Business Ethics* (2015). These publications have been widely utilized by students, practitioners, and policymakers across Tanzania and East Africa. He is also finalizing a book on *Entrepreneurship Development in Tanzania*. Prof. Mbura has actively participated in national and international scholarly conferences, presenting papers in Tanzania, Kenya, the Netherlands, Botswana, China, South Africa, the United Arab Emirates, and the United States. His conference presentations have focused on entrepreneurship, marketing, tourism, organizational development,

responsible business schools, business networking, and SME development. His work has helped bridge the gap between academic theory and business practice, particularly in emerging economies. Beyond academia, Prof. Mbura has extensive consultancy experience spanning more than twenty years. He has served as a consultant, trainer, facilitator, and team leader for numerous public and private institutions, including the Tanzania Revenue Authority (TRA), Bank of Tanzania (BOT), Tanzania Investment Centre (TIC), Tanzania Harbours Authority (TPA), Tanzania Insurance Regulatory Authority (TIRA), Tanzania Electric Supply Company (TANESCO), Tanzania Telecommunications Company Limited (TTCL), Tanzania Communications Regulatory Authority (through evaluation assignments), National Board of Accountants and Auditors (NBAA), Tanzania Institute of Bankers (TIOB), Tanzania Commission for Universities (TCU), Tanzania Institute of Education (TIE), and several universities and higher learning institutions. His consultancy portfolio covers strategic planning, customer care, leadership development, entrepreneurship training, marketing strategy, recruitment and selection, curriculum development, succession planning, and organizational transformation. Prof. Mbura has played a significant role in quality assurance and higher education development through external examination and accreditation assignments. He has served as an external examiner for numerous universities in Tanzania and the East African region. He has also participated extensively in institutional accreditation and curriculum review exercises coordinated by national regulatory bodies. Throughout his academic career, Prof. Mbura has supervised and mentored a large number of undergraduate, master's, and doctoral students in entrepreneurship, management, marketing, and business administration. Prof. Mbura's international collaborations include academic engagements with universities and institutions in Sweden, South Korea, the United States, Botswana, Kenya, the Netherlands, and the United Arab Emirates. He has participated in research collaboration initiatives, curriculum development projects, postgraduate supervision networks, and entrepreneurship development programmes that have enhanced the global visibility of Tanzanian scholarship

4 CATEGORY 4: DISTINGUISHED INNOVATOR OF THE YEAR

4.1 College of Agricultural Sciences and Food Technology (CoAF)

4.1.1 An Innovative Vertical Compartmented Hive for Sustainable Management and Multiplication of Axestotrigona Stingless Bees

Christopher Mduda [1] and Gabriel Mwambogela

Abstract

Stingless bees of the genus *Axestotrigona* are among the most promising native pollinators for sustainable meliponiculture in tropical Africa. They produce highly valued honey with unique medicinal and nutritional properties, while also playing an important role in pollination and biodiversity conservation. *Axestotrigona* species build organized horizontal brood combs that gradually expand as colonies grow. While this nest architecture offers opportunities for colony management, conventional hive designs often limit efficient honey harvesting and make colony multiplication difficult and disruptive. This project introduces an innovative vertical compartmented hive specifically designed for *Axestotrigona* species, building from our previous study on the species' nest architecture in their natural environment. The hive consists of stackable compartments that support natural horizontal comb construction while allowing progressive colony expansion. Separate compartments can be easily detached during management, enabling selective harvesting of honey and simplified colony division for propagation. As brood combs develop across compartments, colonies can be multiplied sustainably by separating occupied sections without excessive destruction or disturbance to the parent colony. The design aims to improve management efficiency, colony survival, and scalability of stingless beekeeping. By facilitating both honey production and controlled colony multiplication, the hive offers a practical solution to reduce dependence on destructive wild nest harvesting while supporting conservation of native stingless bee populations. This innovation has potential applications in sustainable livelihoods, pollinator conservation, training, research, and commercial meliponiculture development.

Keywords: *Innovation, Sustainability, Bees, Pollination*

1 Department of Chemical and Processing Engineering University of Dar es Salaam

4.2 College of Humanities (CoHU)

4.2.1 Folded Memory of Whispering Leso: Maternal Narratives and Kanga Design Process a Practice-Based Inquiry with Pregnant Women, and Mothers in Tanzania

Safina Kimbokota [1]

Abstract

Kanga is a traditional cloth from East Africa that holds cultural significance and reflects Swahili identity. According to researchers Lutomia, A. N., & Birch, S. (2017: 39-45), the word "Swahili" is used to refer to an ethnic identity group formed during the Indian Ocean slave trade and in the post-abolition era. Kanga started as utilitarian clothing and has continued developing into an important symbol of Swahili culture. The Kanga originated from the influence of Portuguese traders, who brought textiles, especially calico *(Kaniki)* fabric from India, to the East African Coast as part of their trade goods. The early Kanga design is believed to have been created using sweet potatoes, cassava, onions, and wood blocks for printing, featuring black polka dots on a white rectangular cotton fabric. The black dots against the white background cloth reminded the Swahili people of the colors found in guinea fowl feathers, which are also known as "Kanga" in Swahili. According to fashion designer Farouque, A. (2008:99), the original handmade kanga was first worn in Mombasa during the early 1860s. The Portuguese term *"lenço,"* meaning "handkerchief," and a predecessor fabric that likely inspired the kanga was called the *"leso ya kushona",* sewn leso. It is said that fashionable Swahili women had the idea to join six large square cotton handkerchiefs and sew them together into a rectangle measuring three columns by two rows, creating a light fabric for wrapping around their bodies. A textile scholar, Beck, R. M. (2000: 105), notes that the first kanga in Zanzibar was named *'Kanga za Mera',* which was hand-stamped onto plain cloth using wooden carved blocks. After slavery ended in 1897, women in Zanzibar began adding patterns using techniques like resist dyeing and block printing.

Keywords: *Innovation, Khanga, Women, Pregnancy*

1 College of Humanities University of Dar es Salaam

4.3 College of Natural and Applied Sciences (CoNAS)

4.3.1 Duracem sustainable pavement materials, Duracem 1A stabilizers for cold-mix asphalt, Novacem multifunctional construction materials, FluoroGuard fluoride removal systems, Fluxen biogas upgrading technologies, BentoX-TZ drilling and sealing materials, GeoCatalytic pollutant remediation technologies, and low-emission coal briquette technologies

Makungu Madirisha [1]

Abstract

Road construction remains one of the most energy-intensive infrastructure activities, contributing significantly to fuel consumption, greenhouse gas emissions, and lifecycle maintenance costs. To address these challenges, the project developed Duracem and Duracem 1A, two innovative technologies for sustainable road infrastructure development. Duracem is a low-carbon binder designed for pavement concrete applications, including rigid pavements and lean concrete bases, while Duracem 1A is an advanced stabilizer developed to enhance the performance of cold-mix asphalt. The technologies were developed through a collaborative research and innovation programme between the Department of Chemistry at the University of Dar es Salaam and Starpeco Company Limited, with Starpeco playing a key role in field deployment, validation, and practical implementation. In addition to generating innovative road construction technologies, the project contributed to human-capacity development through the active involvement of two young scientists, Mr. Jasson M. Kaijage and Ms. Evalina E. Samba, who participated in technology development, laboratory evaluation, field validation, and innovation deployment activities. Duracem improves strength development, durability, and resistance to environmental degradation, providing a sustainable alternative for pavement concrete construction. Duracem 1A addresses key limitations of cold-mix asphalt, including slow strength development, moisture susceptibility, and reduced resistance to traffic-induced distress. Laboratory investigations demonstrated significant improvements in mechanical strength, stability, cohesion, moisture resistance, load-bearing capacity, and resistance to rutting, stripping, cracking, and permanent deformation. These enhanced performance characteristics make the technologies suitable for road construction, rehabilitation, and maintenance applications. A major achievement of the project is the successful transition from laboratory research to field deployment through a strong academia–

1 Department of Chemistry University of Dar es Salaam

industry partnership. Real-world applications have demonstrated the technical feasibility, scalability, and commercialization potential of both technologies, providing a practical pathway for technology transfer and adoption within the road construction sector. Collectively, Duracem and Duracem 1A reduce energy consumption, lower greenhouse gas emissions, decrease construction and maintenance costs, and reduce dependence on imported construction additives. The technologies promote local innovation, industrial development, and value addition while supporting low-carbon and climate-resilient infrastructure systems. The project demonstrates the transformative role of chemistry-driven innovation and university–industry collaboration in advancing sustainable infrastructure development, technology commercialization, and socio-economic transformation in Tanzania and beyond.

Keywords: *Duracem; Duracem 1A; Sustainable Road Infrastructure; Pavement Concrete; Cold-Mix Asphalt; Low-Carbon Technologies*

4.4 Mbeya College of Health and Allied Sciences (MCHAS)

4.4.1 Doctor's Best Friend: AI linked Next-Generation Dual-Mode Mobile-Based Clinical Decision Support App in Healthcare Delivery

Wito Tinga [1]

Abstract

Introduction: Doctor's Best Friend is applied as a dual-mode mobile clinical decision support application used at the point of care and in the community to improve evidence-based clinical decisions, prescribing safety, referrals, and patient adherence in resource-limited settings. Even with elite doctor's unavoidable problem is the delayed clinical decision-making, irrational prescribing, fragmented referral systems, inadequate continuity of care, and restricted access to real-time evidence-based guidelines. These contribute to preventable morbidity and mortality.

Objective: To develop an integrated, dual-mode mobile Clinical Decision Support Ecosystem that enhances clinical decision-making, improves medication safety, strengthens patient engagement in resource-limited settings.

Methods: Doctor's Best Friend was developed as a unified digital health

1 Department of Social Sciences MCHAS

ecosystem integrating Healthcare Provider Mode and Patient Mode within a single mobile platform capable of both offline and online functionalities. The Healthcare Provider Mode incorporates standardized clinical decision tools including WHO, KDIGO renal assessment guidelines, GOLD classification for respiratory disease, drug to drug interaction screening, renal dose adjustment alerts, emergency clinical protocols, and an embedded clinical learning library to support continuous professional development. The Patient Mode provides accessible and inclusive digital health services, including multilingual voice-assisted medication reminders, appointment tracking systems, immunization schedules, maternal and child health monitoring tools, and simplified health education modules tailored for low-literacy populations.

Results: A pilot implementation involving 30 healthcare workers demonstrated a 93% system acceptance rate, a 32% reduction in perceived clinical workload ($p < 0.01$), and a 41% improvement in referral decision accuracy ($p = 0.004$).

Conclusion: Doctor's Best Friend represents a scalable and transformative clinical decision support ecosystem that bridges provider–patient digital health interactions.

Keywords: *AI, Mobile, Doctor, Healthcare*

4.5 Mkwawa University College of Education (MUCE)

4.5.1 Transformation of marine and agricultural biomasses into high-value products for sustainable and innovative applications

Fednand Cosmas Kindole [1], Elianaso Elimbizi and Hassan Kalilo

Abstract

Globally, over 1.3 billion tons of agricultural and food waste and ~23.8 million tons of marine shells are discarded annually, creating severe environmental pressures on terrestrial and marine ecosystems. These underutilized biomasses—marine shells, seaweeds, plant flowers, and waste peels—are rich in cellulose, starch, chitin/chitosan, carrageenan, and bioactive compounds that can be upcycled into high-value, eco-friendly products. This research develops integrated valorization pathways combining selective fractionation and mild chemical conversion of materials to produce: (i) bio-plastics with tensile strengths up to 154.9 MPa meeting or exceeding most petroleum-based plastic

1 Mkwawa University College of Education

particularly polyethylene (~22 MPa) for food packaging and agricultural pots; (ii) biopolymer-based edible coatings and films that extend food shelf life by up to 21 days at 0.5% coating, improving food safety and reducing post-harvest losses; (iii) biopolymeric textile fibers with enhanced water uptake, mechanical integrity, and thermal stability (decomposition 240–410 °C), suitable for biodegradable biomedical sutures and sustainable textiles; (iv) nanofibers and carbonaceous adsorbents for water filtration, demonstrating high adsorption capacity for contaminants, and biofertilizers that improve soil organic matter and nutrient availability for agricultural productivity. Pilot-scale conversion of extractable fractions achieved 50–80% yields with net lifecycle greenhouse-gas reductions versus petrochemical alternatives. Techno-economic analysis identifies market-ready niches in packaging, textiles, biomedical devices, water treatment, and agriculture, particularly in coastal and agricultural regions. By transforming abundant residues into high-performance, low-impact materials, this work advances waste reduction, circular bioeconomy adoption, and green technology deployment for industry and environmental resilience.

Keywords: *Biomass valorization; bioplastics; sustainable textiles; biodegradable sutures; water filtration; nanofibers*

4.6 School of Journalism and Mass Communication (SJMC)

4.6.1 Research Compass: An Adaptive Digital Learning Platform for Postgraduate Research Training in Communication and Media Studies

Sophia Kokugonza Ndibalema [1]

Abstract

Postgraduate research training in African universities operates under a persistent structural strain: rising student enrolments against limited supervision capacity, scattered and often decontextualised learning resources, and high attrition at the proposal and methodology stages. Students rarely struggle because they lack ability; they struggle because the guidance available to them is fragmented across textbooks, supervisors' offices, and late-night searches, and is seldom grounded in the African research environment in which their studies actually take place. SKN Research Compass was developed as a digital innovation to address this gap. It is an adaptive online learning platform that walks

1 School of Journalism and Mass Communication

postgraduate researchers in Public Relations, Corporate Social Responsibility Communications, Strategic Communication, and Media Studies through the full research journey — from understanding research and choosing a topic, through problem framing, theoretical and conceptual frameworks, methodology, data collection and analysis, to writing, presenting, and research ethics. The platform integrates ten structured learning modules, twenty-four theoretical frameworks with applied guidance, a curated reference library, and interactive practice tools including a Problem Statement Builder, a Methodology Selector, and a Master Quiz. Examples and case material are deliberately drawn from the Tanzanian and East African contexts, and modules are paired with examiner-perspective notes on common mistakes and how to avoid them. The platform is accessible by subscription with a seven-day free trial, and complements rather than replaces formal supervision. Early student response has been positive, indicating that the platform reduces the foundational burden on supervisors and supports more confident, self-directed research practice. Planned developments include accessibility features for learners with disabilities, a dedicated repository to amplify African scholarship published in local and regional journals that currently lack visibility, an open channel for academics to share their Africa-focused research with postgraduate audiences, and expansion to additional disciplines in response to demand - positioning the platform as a scalable infrastructure for democratising postgraduate research training across African higher education.

Keywords: *Postgraduate Research Training, Adaptive Learning, Digital Innovation, African Scholarship, Inclusive Education, Research Supervision*

4.7 School of Mines and Geosciences (SoMG)

4.7.1 Real Time Monitoring and Controlling Operating Parameters in Vat Leaching Plant using GSM Communication

Ambroce Itika [1], Mwakalonge Mackson, Malack Shedrack Ezekiely, Benard Ivo Sosthenes, Mwacha Bernadetha Felician

Abstract

This project focuses on the design and development of an automated monitoring and control system for a VAT leaching plant using sensors, a microcontroller, and GSM communication. The main aim of the project is to improve the monitoring of important operating parameters such as pH, solution level, and flow rate during the gold leaching process. In many small-scale gold processing plants, these parameters are monitored manually, which may lead to delays, human error, and reduced process efficiency. The system uses sensors to collect real-time data from the VAT tank, barren tank, and dosing tank. The collected data is processed by a microcontroller, which compares the measured values with preset operating limits. When abnormal conditions occur, such as low pH or high solution level, the system automatically activates the dosing pump and sends an SMS alert to the plant operator through a GSM module. The system was first tested through simulation using Proteus software and Arduino IDE before developing the functional prototype. The expected outcome is an efficient, low-cost, and reliable automation system that improves gold recovery, reduces manual monitoring, and enhances safety in small-scale and remote gold processing plants.

Keywords: *Real Time, Monitoring, GSM, Leaching Plan, Automation*

1 Department of Chemical and Processing Engineering University of Dar es Salaam

5 CATEGORY 5: EXCELLENCE AWARD FOR THE BEST POSTGRADUATE INNOVATION PROJECT

5.1 College of Agricultural Sciences and Food Technology (CoAF)

5.1.1 A Novel Hive for Sustainable Management Hypotrigona Stingless Bees

Sued Mussa[1]

Abstract

The minute stingless bees of the genus Hypotrigona are increasingly attracting attention for their highly valued medicinal honey, gentle behavior, and remarkable ability to adapt to different nesting environments. These qualities make them promising candidates for sustainable stingless beekeeping (meliponiculture) and livelihood improvement in the African tropics. However, managing Hypotrigona colonies in conventional hive designs remains difficult because of their unique nest architecture. Unlike many other stingless bees, Hypotrigona species construct delicate brood structures suspended from the upper section of the nest. In common top-opening hives, routine activities such as colony inspection and honey harvesting often damage brood cells, disrupting colony growth and weakening the colony. To address this challenge, a new hive design was developed specifically for Hypotrigona species. The innovative hive separates the brood-rearing chamber from the honey storage compartment, enabling honey harvesting with minimal disturbance to developing brood. The design also improves colony accessibility, handling, and management efficiency while maintaining colony stability. This innovation provides a practical solution for the domestication and conservation of Hypotrigona species. By reducing colony disturbance and improving management success, the hive has potential to support sustainable stingless beekeeping, enhance honey production, and promote conservation of these important pollinators. The design may also encourage management of Hypotrigona species among farmers, researchers, and conservation practitioners.

Keywords: *Hive, Sustainable, Bees, Hypotrigona*

1 Department of Crop Sciences and Beekeeping Technology

5.2 College of Engineering and Technology (CoET)

5.2.1 Development of adsorption column system for treatment of wastewater generated from general repair and maintenance garages

Janeth Chrisant[1], Mahir Said and Neema Msuya

Abstract

This study developed a dual-column upflow adsorption system for treating wastewater from general repair and maintenance garages in Dar es Salaam-Tanzania. The system employed Jacobi's coconut shell activated carbon to remove Polycyclic Aromatic Hydrocarbons (PAHs). Physicochemical characterization of wastewater from five selected garages was conducted in accordance with TZS 860:2015 while PAHs analysis followed EU standards (Directive 2008/105/EC). Wastewater parameters across sampling sites were as follows: pH (8.12-8.67), COD (100-220 mg/L), BOD (80-190 mg/L), TSS (34-110 mg/L) and TDS (227-6111 mg/L). GC-MS analysis confirmed PAHs concentrations ranging from 1.45 x 10−4 to 38.92 x 10−4 mg/L, highlighting the need for effective polishing treatment stage. The system, designed with a 1:10 diameter-to-height ratio and validated via SolidWorks, was evaluated using a full factorial design. Results demonstrated high removal efficiencies ranging from 62.1% to 92.5%, with performance improving at greater bed heights and lower flow rates. Kinetic modeling showed an excellent fit with the Thomas model (R2 = 0.97– 0.99), indicating that the process is governed by second-order reversible reaction kinetics with a maximum adsorption capacity of 8.25 mg/g. Furthermore, in- situ regeneration of activated carbon using 3% NaOH restored adsorption capacity by approximately 90%, proving the system's sustainability for decentralized wastewater treatment.

Keywords: *Coconut Shell Activated Carbon, Dual-column Upflow Adsorption System, Garage Wastewater, Polycyclic Aromatic Hydrocarbons (PAHs), Thomas Kinetic Model*

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5.3 College of Humanities (CoHU)

5.3.1 Folded Memory of Whispering Leo Maternal Narratives and Kanga Design Process: A Practice-Based Inquiry with Pregnant Women and Mothers in Tanzania

Safina Kimbokota[1]

Abstract

My artistic research begins in the silence between cultural ideal and lived reality. I position the traditional East African Kanga/Leso cloth not as a decorative fabric but as a critical archive of unspoken maternal testimony. I have produced a series body of artistic artworks, integral to my PhD research, I used the Kanga's inherently function as a communicative object to investigate the complex, often isolating emotional realm of pregnancy and motherhood in contemporary Tanzanian society. As a mother and visual artist, my practice is grounded in the disquieting questions that arise when private experience collides with public expectation, the study asks: how can participatory textile practices transform isolated experiences of pregnancy and childbirth into shared testimony that advances societal security and well-being? Employing a methodology of participatory action research, the project conducted co-creation workshops with ten pregnant women and ten mothers at Rangi Gallery and Nafasi Artspace respectively. Participants used woodblock printing, screen-printing, and stitching to translate personal experiences onto leso fabric, producing a series body of artistic artworks as follows an immersive installation entitled: Inception which uses a 6'×6'×6' cubic structure, layered soundscapes, and symbolic textile elements to evoke the fragility of conception and the tension between hope and vulnerability inspired by personal experiences, and a collaborative tapestry entitled: Whispering Leso Tapestry, and communal responses printed on cylindrical format entitled: Woven Voices. The theoretical framework integrates Kolb's experiential learning theory which structures the workshop cycle of concrete experience, reflective observation, imaginative conceptualization, and active experimentation with Hartsock's feminist standpoint theory, which honors the embodied knowledge of marginalized voices as a foundation for epistemic and social transformation. The preliminary findings demonstrate that the Kanga/Leso, historically a medium for women's communication, can be used as a powerful tool for breaking silence around maternal experiences, mental health cases, and improved maternal services both in government and private hospitals

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in Tanzania. The collaborative process transforms private distress into public testimony, fostering collective consciousness and community resilience. The interactive exhibition component including a tag station where visitors contribute their own truths extends the research into a public forum, aligning with national priorities for maternal health (SDG 3), gender equality (SDG 5), and reduced inequalities (SDG 10). By merging analog textile traditions with immersive, sensory installation, the project models a low-tech, culturally resonant form of societal security that addresses psychological safety, dignity in healthcare, and the strength of communal conversation. It contributes a replicable methodology for art-based health advocacy and positions artistic research as a vital contributor to Tanzania's sustainable development goals

Keywords: *Maternal narratives, Kanga/Leso, participatory action research, experiential learning, feminist standpoint theory, societal security, SDGs, practice-based research, Tanzania*

5.4 College of Information and Communication Technologies (CoICT)

5.4.1 An IOT-enabled adaptive control system for sea cucumber hatcheries: a computational approach to sustainable aquaculture in Tanzania

Chumu Omary Said[1], Abdi Abdalla and Hadija Mbembati

Abstract

Sea cucumber aquaculture of Holothuria scabra is vital for sustainable marine management due to its ecological role in nutrient recycling and seagrass health, plus high commercial value. In Tanzania, it offers economic diversification and livelihoods within the Blue Economy framework.

Hatchery systems are highly sensitive to fluctuations in temperature, dissolved oxygen, and pH, causing inconsistent larval survival, low productivity, and high costs. Manual monitoring is inefficient and error-prone. Digital technology adoption remains minimal in Tanzania despite national aquaculture priorities. A systematic literature review (2010–2024) across Scopus, Web of Science, IEEE Xplore, ScienceDirect, and Google Scholar, plus case studies from China, Indonesia, Vietnam, Norway, and India, synthesized insights from 65 publications. This informed the design of an IoT system integrating sensors, edge computing, cloud platforms, and PID adaptive controls. The framework

1 Department of Electronics and Telecommunication Engineering

enables continuous real-time monitoring and automated regulation via actuators (aerators, pumps, temperature regulators), maintaining optimal larval conditions (26–30 °C, >5 mg/L DO, 7.8–8.3 pH) and significantly improving environmental stability. The IoT-enabled system enhances larval survival, efficiency, and resilience, accelerating sustainable sea cucumber aquaculture in Tanzania while advancing Blue Economy goals. Future research must prioritize pilot deployment and local validation

Keywords: *Sea Cucumber, Hatchery, Blue Economy, Marine*

5.5 College of Natural and Applied Sciences (CoNAS)

5.5.1 Tokomeza mapunye: a natural synergistic formulation against tinea capitis

Angel Yohana Mbwafu[1], Clarence A. Mgina and Christopher A. Mduda[2]

Abstract

Tinea capitis (commonly known as scalp ringworm or mapunye) is one of the most prevalent fungal infections affecting children and young adults, particularly in developing countries. The disease is primarily caused by dermatophytic fungi and remains a significant public health challenge due to limited access to effective treatment, increasing concerns about antifungal resistance, treatment costs, and potential side effects associated with synthetic antifungal drugs. There is therefore an urgent need for safe, affordable, and effective alternative therapies derived from natural products. This study investigated the antifungal potential of essential oils extracted from cinnamon, clove, lemongrass, and lemon fruit peels, as well as propolis extracts, against two common dermatophyte pathogens, Trichophyton rubrum and Microsporum gypseum. The study further explored the synergistic effects of combining these natural products to enhance antifungal efficacy and develop a novel plant-based formulation for the management of Tinea capitis. Laboratory evaluations demonstrated remarkable antifungal activity among the tested extracts. Essential Oil D (EOD) exhibited the highest potency, achieving minimum inhibitory concentrations (MICs) as low as 0.098%, outperforming several other extracts. The antifungal performance of the formulations was benchmarked against Terbinafine, a widely used commercial

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antifungal drug, confirming the effectiveness of the natural products. Chemical characterization using Gas Chromatography–Mass Spectrometry (GC-MS) identified up to 46 bioactive compounds responsible for the observed antifungal properties. Synergistic interactions among selected formulations were assessed using the Fractional Inhibitory Concentration Index (FICI), which revealed strong synergistic effects in combinations such as EOD + EOA and EOD + Propolis. Furthermore, poisoned agar assays demonstrated complete (100%) inhibition of fungal growth when optimized formulations, particularly EOD + EOA and EOD + EOA + Propolis, were applied against the target pathogens. The findings provide strong scientific evidence supporting the development of innovative, plant-based antifungal formulations as safe, effective, and affordable alternatives for the treatment of scalp ringworm. The project demonstrates the potential of Tanzania's natural resources to contribute to pharmaceutical innovation, public health improvement, and the commercialization of locally developed healthcare products.

Keywords: *Tinea capitis; Scalp Ringworm; Essential Oils; Propolis; Antifungal Activity; Synergistic Formulations; Natural Products; Dermatophytes; Pharmaceutical Innovation; Tanzania.*

5.6 College of Social Sciences (CoSS)

5.6.1 Does Free Antenatal Care Guarantee Access? The Mediating Role of User Fee Exemption Policy on Antenatal Care Utilization in Kiteto District, Tanzania

Theresia Francis[1], Maurice Mbago[2], Joyce Manahiri[3]

Abstract

Financial barriers, such as user fees and out-of-pocket payments, significantly limit access to essential maternal health services in Sub-Saharan Africa. In Tanzania, despite policies designed to improve access, financial obstacles persist, particularly at the primary care level. This study aimed at assessing the determinants of antenatal care services accessibility in public primary health facilities in Kiteto District, Tanzania under the mediating role of user fee exemption policy. A cross-sectional study was conducted between September 2022 and May 2023, involving 427 women who had given birth within the

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2 Department of Statistics, University of Dar es Salaam
3 Department of Geography, University of Dar es Salaam

preceding five years. Participants were recruited through multistage and simple random sampling from four villages and data were collected through household survey among women of childbearing age (15-49 years). Data analysis employed descriptive statistics and binary logistic regression with statistical significance set at $p<0.05$. The study found that only 33% of women completed four or more antenatal visits. Although 43% benefited from fee exemptions, 52.2% still incurred out-of-pocket payments, mainly for medications and delivery kits. Multivariate analysis identified education (aOR=3.3; 95% CI: 1.950-5.662; $p<0.001$), occupation (aOR=1.9; 95% CI: 1.021-3.633; $p<0.05$) and income (aOR=1.34; 95% CI: 0.728-2.467; $p<0.05$) as significant predictors of out-of-pocket expenditure among women of childbearing age. Residence (aOR=3.4; 95% CI: 1.114-10.502; $p<0.05$), distance to facility (aOR=3.2; 95% CI: 1.278-8.013; $p<0.05$) and health insurance (AOR=2.1; 95% CI: 1.020-4.420; $p<0.05$) were significant predictors of four or more antenatal care completion, regardless of fee exemptions. Additionally, education, mode of transport, quality of care and affordability significantly influenced the accessibility of antenatal service use. The high prevalence of out-pocket payments for additional services reduces the benefits of exemption policies, creating barriers to adequate antenatal care and undermining equity and quality in ma-ternal health services. To improve maternal health outcomes, district health managers should ensure comprehensive implementation of exemption policies to cover essential medicines and pregnancy complication diagnosis, thereby reducing financial burdens on pregnant women. Government and stakeholders should also design maternal health-specific insurance schemes to advance universal health coverage, aiming to lower ma-ternal mortality and ensure equitable access. Further research is needed to develop cost-effective, culturally acceptable strategies to raise awareness of early antenatal initiation, particularly within pastoralist communities.

Keywords: *Free antenatal care; User fee exemption policy; Antenatal care utilization; Access to healthcare; Mediating role; Tanzania*

5.7 Dar es Salaam University College of Education (DUCE)

5.7.1 Nutritional Value, Growth Performance, and Economic Viability of Black Soldier Fly Larvae Meal as a Protein Source in Broiler Chicken Diets

Zephania Majula Malongo[1], Lucas Paul Luchemba, Alice Isibika

Abstract

Conventional protein feed ingredients, especially soybean meal and fish meal, that account for a large share of production costs, are expensive and not widely available, which has hindered poultry production in Tanzania. The Black Soldier Fly larvae (BSFL) Hermetia meal has been identified as a promising alternative source of protein, due to its high crude protein content, favourable amino acid profile, ability to utilise organic waste substrates and potential contribution to sustainable livestock production. However, there is limited information on the nutritional value, digestibility, effects on growth performance and economic viability of locally produced BSFL meal in grill chicken diets under Tanzanian conditions. The aim of this study was to evaluate the nutritional value, growth performance and economic feasibility of BSFL meal as a substitute of soybean meal and fish meal in grill diets. Two hundred one-day-old Cobb 500 grill chickens will be randomly allotted to five dietary treatments (0, 25, 50, 75 and 100% replacement levels of conventional protein sources by BSFL meal) in a completely randomised design (CRD). The BSFL will be reared on standardised organic waste substrate and processed into meal for feed formulation. Chemical analyses will be used to determine proximate composition, amino acid profile, mineral content, coefficients of nutrient digestibility, and metabolisable energy values. Growth performance parameters such as body weight gain, feed intake, feed conversion ratio and protein efficiency ratio will be measured during 42-days of feeding period. Cost-benefit analysis and return on investment calculations will be used to evaluate economic performance. The present study is expected to find the best replacement level of soybean meal and fish meal with BSFL meal while maintaining or improving broiler performance and reducing feed costs. The findings will provide scientific evidence for the incorporation of BSFL meal into poultry feed formulations in Tanzania, contributing to sustainable poultry production, waste valorization, improved food security, and circular economy development.

Keywords: *Black Soldier Fly Larvae (BSFL), Broiler Chicken, Protein Source, Nutrient Digestibility, Growth Performance, Feed Conversion Ratio, Economic Viability, Poultry Feed*

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5.8 Institute of Resource Assessment (IRA)

5.8.1 Development of chemically activated bioadsorbents derived from potatoes peel wastes for removing Fluoride from Drinking water: A case study of Monduli District Arusha, Tanzania

Paulina Steven Mlamka[1], Dativa Shilla, Stanslaus Mtavangu

Abstract

According to the World Health Organization (WHO), fluoride concentrations above 1.5 mg/L in drinking water pose a serious public health concern, as prolonged exposure can lead to dental and skeletal fluorosis. Various conventional defluoridation methods have been applied; however, these techniques are often expensive and complex, limiting their application in low-resource countries such as Tanzania. Therefore, it is essential to develop low-cost adsorbents from locally available carbonaceous materials for fluoride removal from drinking water. This study focused on converting potato peel waste into high-surface-area adsorbents with modified surface functional groups through chemical activation followed by carbonization for adsorption of fluoride from drinking water. Potato peel waste in powder form was chemically activated using phosphoric acid (H_3PO_4) and potassium hydroxide (KOH), followed by carbonization at 450 °C and 800 °C. The resulting adsorbents, potassium hydroxide-activated adsorbent (ACPK) and phosphoric acid-activated adsorbent (ACPP), were characterized using Fourier Transform Infrared Spectroscopy (FTIR), X-ray Diffraction (XRD), Brunauer–Emmett–Teller (BET), and Thermogravimetric Analysis (TGA). The effects of adsorption parameters, including adsorbent dose, pH, contact time, temperature, and initial fluoride concentration, were investigated. FTIR analysis confirmed the presence of functional groups such as hydroxyl, carboxyl, and phosphate groups, which are important for fluoride adsorption. XRD analysis revealed the amorphous nature of the chemically activated adsorbents, with broad peaks at $2\theta = 24°$ and 44°. BET analysis indicated microporous materials with surface areas of 982.813 m^2/g and 939.873 m^2/g for ACPK and ACPP, respectively. Fluoride removal efficiencies were 87.8% and 86.4% for ACPK and ACPP, respectively. The adsorption equilibrium data fitted well to the Freundlich isotherm model. Kinetic data were best described by the pseudo-second-order model, with R^2 values of 0.989 and 0.999 for ACPK and ACPP, respectively, suggesting that chemisorption was the dominant adsorption mechanism. Overall, this study demonstrates that potato peel-derived adsorbents activated with potassium hydroxide (ACPK) and phosphoric acid (ACPP) are

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cost-effective, readily available, and environmentally friendly materials suitable for fluoride removal from drinking water.

Keywords: *Potato Peel waste, Chemical Activation, Carbonization, Adsorption, Fluoride*

5.9 School of Aquatic Sciences and Fisheries Technology (SoAF)

5.9.1 Biofloc IMTA Integration: Enhancing Milkfish (Chanos chanos) Growth, Nutritional Value, and Coastal Sustainability with Seaweed (Ulva lactuca) and Ark Clams (Anadara antiquata)

Upendo Ulomi[1] and Betina Lukwambe

Abstract

Global seafood demand continues to rise, creating pressure for aquaculture systems that are both productive and environmentally sustainable. Conventional fish farms often rely on costly feeds and generate waste that deteriorates water quality. Integrated multitrophic aquaculture (IMTA), when combined with biofloc technology, offers a promising solution by recycling nutrients and enhancing ecosystem services. This study evaluated the performance of milkfish (Chanos chanos) cultured in biofloc systems integrated with seaweed (Ulva lactuca) and ark clams (Anadara antiquata). Four treatments were tested over eight weeks: milkfish monoculture (MM), milkfish + clams (MB), milkfish + seaweed (MS), and milkfish + clams + seaweed (MBS). Each 60 L tank was stocked with 30 milkfish fry (1.5 g) and 20 clams, while seaweed was introduced at 2 g L^{-1} in a 500 L biofiltration chamber. Results showed significantly higher growth performance and feed utilization efficiency in integrated treatments, particularly MS and MBS, compared to monoculture. Survival exceeded 92% across treatments, with a slight reduction in MB. Biofloc harvested contained 35–40% protein, while milkfish muscle protein reached up to 61%, indicating efficient nutrient assimilation. Integration of seaweed and clams improved water quality through nutrient recycling and particulate reduction, leading to healthier fish and reduced feed costs. Overall, the findings demonstrate that biofloc-based IMTA systems can enhance aquaculture productivity, reduce environmental impacts, and provide a sustainable pathway to meet global seafood demand.

Keywords: *Biofloc, Integrated multitrophic aquaculture, Chanos chanos, Ulva lactuca, Anadara antiquata*

1 Department of Aquaculture Technology

5.10 School of Education (SoED)

5.10.1 The Effects of Guided Inquiry-based Experiment on Student's Learning Physics in Secondary Schools in Tanzania

Baraka Mbata[1] , Wadrine Maro and Venance Timothy[2]

Abstract

The Guided Inquiry-Based Experiments (GIBE) approach gives students greater autonomy in planning and conducting investigations of physical phenomena, unlike the Traditional-Based Experiments (TBE) approach commonly used in Tanzanian secondary schools, which relies on following prescribed procedures. Given the persistent challenge of low achievement in Physics, this study investigated the effect of GIBE on students' knowledge acquisition, practical skills development, and interest in learning Physics. The study was informed by constructivist learning theory, particularly John Dewey's view that learners construct knowledge through active engagement and inquiry. A laboratory worksheet was developed and validated using the 4-D Model (Define, Design, Develop, and Disseminate), and the intervention was implemented through the inquiry-learning stages of Orientation, Conceptualisation, Investigation, Conclusion, and Discussion. Using a quantitative approach and a non-equivalent quasi-experimental design, data were collected from 82 secondary school students and two Physics teachers from Iringa and Morogoro regions. Data analysis involved descriptive statistics and inferential tests, including paired-sample and independent-sample t-tests, complemented by Cohen's d effect sizes using Statistical Package for Social Sciences (SPSS version 25). The findings revealed that GIBE significantly enhanced students' knowledge acquisition compared to TBE. Students in the experimental group achieved a higher mean score ($M = 32.53$, $SD = 13.00$) than those in the control group ($M = 20.72$, $SD = 5.38$), with the difference being statistically significant, $t(66) = 5.57$, $p < .001$, and associated with a large effect size ($d = 1.37$). Further analysis showed that GIBE had a strong positive effect on conceptual knowledge ($p < .001$, $d = 1.63$) and metacognitive knowledge ($p < .001$, $d = 1.37$), while procedural knowledge improved with a moderate effect size ($p = .044$, $d = .51$). However, no statistically significant difference was observed in factual knowledge acquisition ($p = .065$,

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d = .41). The intervention also produced substantial improvements in practical skills. Students in the experimental school attained a significantly higher mean score (M = 48.33, SD = 9.04) than their counterparts in the control school (M = 27.67, SD = 5.61). This difference was statistically significant, t (77) = 11.61, p < .001, with a very large effect size (d = 2.67), indicating that GIBE was highly effective in developing practical skills and scientific inquiry skills. In contrast, the effect of GIBE on students' interest in learning Physics was not statistically significant. The experimental group recorded a mean score of 3.64 (SD = 0.18) compared to 3.59 (SD = 0.16) in the control group, yielding t (78) = 1.31, p = .193, with a small effect size (d = .28). This suggests that while GIBE enhanced learning outcomes and practical performance, its influence on students' interest was limited during the study period. Overall, the study concludes that GIBE is more effective than TBE in improving Physics learning, particularly in knowledge acquisition and practical skill development. The findings recommend that Physics teachers actively scaffold learners in designing investigations, analyzing evidence, and evaluating experimental results to promote meaningful and effective learning in secondary school Physics.

Keywords: *Knowledge, practical skills, interests, guided inquiry, laboratory experiments.*

5.11 School of Mines and Geosciences (SoMG)

5.11.1 Strategic zoning for natural gas distribution in Tanzania: A Dar es Salaam case study

Ali Said Ali[1], Adela Syikilili and Fulmence Kaborogo

Abstract

Dar es Salaam is experiencing rapid urbanization, which has intensified the need for reliable and sustainable energy solutions. The city' s growing industrial and residential sectors face increasing demand for natural gas, yet infrastructure expansion has not kept pace. Addressing this gap is critical to ensure equitable energy access and efficient resource allocation. This study develops a strategic zoning framework for natural gas distribution in Dar es Salaam. Using a demand-based prioritization model, the research integrates quantitative analysis with spatial modelling, through two key methods which include Geographic Information System (GIS) analysis and a Bayesian Hierarchical Model (BYM2)

1 Department of Petroleum Science and Engineering

to capture spatial variations in demand across wards. Results categorize the city into four strategic zones, Central, Northern, Coastal, and Southwestern. The Central Zone shows the highest demand intensity, making it the top priority for infrastructure expansion, followed by the Northern, Coastal, and Southwestern zones. Specific wards, such as Mbagala in the Southwestern zone, are highlighted for immediate intervention. The study concludes that a data-driven zoning framework can guide policymakers and utility providers in optimizing infrastructure investment. Recommendations emphasize prioritizing high-demand zones, adopting replicable spatial models for other urban contexts, and aligning energy planning with rapid urban growth to ensure sustainable development.

Keywords: *Natural gas, Urbanization, Energy, Sustainability*

5.12 Mkwawa University College of Education (MUCE)

5.12.1 Efficacy of Trichodesma Zeylanicum Root Extract in Burn Wound Healing in Wistar Rats

Lunzewe Chenya

Abstract

Burn wounds are major public health challenge due to delayed healing. They are extremely painful and can have severe effects both specific and non-specific immune responses, potentially leading to death. Even though standard medicines are most used to treat burns, but healing time criticized to be slow for many people especially of Ruvuma region. This situation makes them to use *Trichodesma zeylanicum* as traditional herbal plant to cure burns, though its effectiveness has not yet been scientifically proven. This study aims to evaluate the burn wound healing potential of *T. zeylanicum* root extracts by integrating both ethnobotanical and experimental approaches. The ethnobotanical survey was conducted in purposefully selected 4 villages using, then semi-structured interviews were administered to 12 respondents. The *T. zeylanicum* roots were collected, prepared and extracted using 70% ethanol, then two treatment doses (10% w/v and 5% w/v) were formulated. Qualitative phytochemical analysis was performed, and burn wound healing efficacy was evaluated in 60 Wistar rats using 4 controlled experimental groups. Ethnobotanical findings involved both male (33%) and female (67%) respondents, mostly aged 61 years and predominantly farmers (67%). Finding show high community knowledge and

application of *T. zeylanicum* plant in burn treatment (83%). Most respondent reported strong effectiveness (87%), high distribution (68%), without additives (63%) and positive perception for 83%. In a plant root extracts phytochemical analysis revealed presence of flavonoids, tannins and saponins while terpenoids and alkaloids were not detected in a sample. Experimental evaluation was conducted in Wistar rats assigned to high-dose extract (10%w/v), low-dose extract (5%w/v), standard treatment (Silver Sulfadiazine Cream USP 1% w/w), and untreated (Normal saline-0.9% w/v) groups. Both morphometric histopathological analyses confirmed the fastest healing to 10% w/v extract, followed by 5% w/v extract, then Silver Sulfadiazine Cream USP 1% w/w and finally negative control (Normal saline-0.9% w/v) that showed delayed healing. Further studies should assess toxicity diabetic wound efficacy, bioactive compound quantification, alternative plant parts and optimize doses below 5% for improved therapeutic application.

Keywords: *Burn, Wound, Extraction, Immune*

5.13 Institute of Marine Sciences (IMS)

5.13.1 Effect of Maize Bran, Rice Bran and Banana Waste Substrates on Biomass Yield, Production Period, and Nutritional Quality of Black Soldier Fly Larvae

Ibrahim Mgata[1], Mbiru Mosses and Samwel Limbu[2]

Abstract

The global demand for sustainable protein sources in livestock and aquaculture feeds continues to rise, yet conventional ingredients such as fishmeal and soybean meal face increasing supply and environmental constraints. Black soldier fly larvae (BSFL) offer a promising alternative due to their ability to convert organic waste into nutrient-rich biomass. However, the growth performance and nutritional quality of BSFL depend largely on the rearing substrate used. This study was conducted from 25 July 2025 to 26 August 2025 (33 days) at the Institute of Marine Sciences Mariculture Centre in Pangani, Tanzania. The objective was to evaluate the effects of three locally available agro-industrial by-products maize bran, rice bran and banana waste on biomass yield, production period and nutritional quality of BSFL. A randomized complete block design

1 Institute of Marine Sciences
2 School of Aquatic Sciences and Fisheries Technology

was used with four replicates per substrate, hence 12 experimental units. Larvae were reared until the 5th instar stage and samples were collected at harvest for analysis of proximate composition, amino acid profile, fatty acid profile and mineral content. Data were collected once at the end of the rearing period. Maize bran produced significantly higher larval biomass ($p < 0.05$) and supported a shorter production period compared to banana waste. Rice bran also supported a shorter production period and produced larvae with the highest lauric acid and mineral content. Banana waste produced larvae with the highest crude fat and lysine content but required the longest production period. Nutritional composition varied significantly among substrates ($p < 0.001$), with crude protein ranging from 24.33% to 46.80%, crude fat from 19.30% to 39.98%, and lauric acid from 28.50% to 45.20%. Maize bran is recommended for farmers prioritizing high biomass yield and protein content. Rice bran is recommended for shorter production periods and for producing larvae rich in antimicrobial fatty acids and minerals. Banana waste remains a viable option for enhancing specific fatty acids and amino acids where other substrates are unavailable. Future research should explore substrate mixtures, economic analysis and feed trials with target animal species.

Keywords: *Black soldier fly, substrate composition, biomass yield, nutritional quality*

6 CATEGORY 6: AWARD FOR THE BEST UNDERGRADUATE INNOVATION PROJECT

6.1 College of Agricultural Sciences and Food Technology (CoAF)

6.1.1 Design and fabrication of semi-automatic cashew nut shelling machine for small and medium processors novel

Danford Japhet[1]

Abstract

Tanzania is a global leader in raw cashew nut (RCN) production, consistently ranking among the top eight producers worldwide and the top four in Africa. However, local processing remains significantly low, with less than 15% of the total harvest being processed domestically due to a lack of affordable and efficient technology (CBT, 2023). This reliance on raw exports results in an estimated loss of over $500 million annually in potential revenue and limits the growth of the domestic manufacturing sector (Ministry of Agriculture, 2024). Currently, existing manual shelling machines suffer from very low efficiency and capacity, making them unsuitable for commercial growth. Meanwhile, fully automatic industrial machines are extremely expensive, making them unaffordable for small to medium scale processors who form the backbone of the local industry. This project addresses this technological gap by designing and fabricating a semi-automatic sheller that utilizes a mechanical driving system to increase productivity for small-medium scale processors. The methodology begins with a comprehensive literature review of existing manual and full-automatic shelling technologies to identify design gaps and engineering standards, engineering design using CAD, material selection focused on mechanical properties and availability for sustainable maintenance, and precision fabrication. The machine's performance was evaluated based on throughput capacity and efficiency, achieving an output of 9-12Kg/hr with 70-85% shelling efficiency. Therefore, it provides an engineering solution that empowers small-medium processors and supports Tanzania Development Vision 2025.

Keywords: C*ashew nut, Shelling Machine, Processing, Harvest, Exports*

1 Department of Agricultural Engineering

6.2 College of Engineering and Technology (CoET)

6.2.1 Production of bioethanol from Maize Cobs

Raphael Julius[1], Mohamed Laurent, Kando Janga and Alice Isibika

Abstract

Maize (Zea mays) is the second most highly produced crop globally and its cultivation generates large amounts of agricultural residue, particularly maize cobs. In the 2024/2025 season, Tanzania achieved a record production of approximately 11.7 million tons of maize, making it the third-largest maize producer in Africa. Maize cobs represent 10–15% of the maize grain yield during maize harvesting, this level of production corresponds to an estimated 1.17 to 1.76 million tons of maizecob residue generated nationally per year. Despite this large quantity, most maize cobs are discarded, left over in the field or burned after harvesting, leading to environmental pollution and waste management challenges. This project aims to utilize maize cobs for bioethanol production because they contain high levels of cellulose (34–40%) and hemicellulose (36–41%), along with relatively low lignin content (9–19%). Maize cobs are collected, washed, sun-dried, and milled into small particles to increase the surface area for treatment. Pretreatment is carried out using 2% (w/v) sodium hydroxide (NaOH) solution at 100°C for 60 minutes to remove lignin and improve cellulose accessibility. The pretreated biomass is then washed repeatedly with distilled water until neutral pH is achieved and dried before hydrolysis. Acid hydrolysis is performed using 1% (v/v) sulfuric acid (H_2SO_4) at 121°C for 30 minutes to convert cellulose and hemicellulose into fermentable sugars. The hydrolysate obtained is adjusted to pH 4.5–5.0 using dilute NaOH or HCl to create favorable fermentation conditions. Fermentation is conducted using Saccharomyces cerevisiae at 30°C for 72 hours under anaerobic conditions with an inoculum concentration of 10% (v/v). The fermented broth is finally distilled at 78°C to recover bioethanol. The study successfully produced bioethanol from maize cobs with an ethanol yield of 69.23 mL/kg of biomass. The results confirm the potential of maize cobs as a low-cost and sustainable feedstock for renewable bioethanol production while also contributing to agricultural waste management and environmental sustainability.

Keywords: *Maize, Cultivation, fabrication, cashew*

1 Department of Chemical and Processing Engineering

6.3 College of Humanities (CoHU)

6.3.1 The Influence of Kanga in Promoting Mineral Wealth, Digital Transformation and Societal Security

Philip Shora[1]

Abstract

The mineral sector is one of the backbones of Tanzania's economy, contributing significantly to national revenue, foreign exchange earnings, employment creation and industrial development. Despite the country's rich endowment of minerals such as gold, tanzanite, diamonds, rubies, garnets, spinel, feldspar, kaolin, marble and quartz, there remains a need for innovative approaches to enhance public awareness, investment promotion, value addition, and market accessibility. Smart Khanga, a digitally enhanced version of Tanzania's iconic cultural textile, aims to bring a revolution to Tanzania's economy and development with just a single click by transforming traditional fabric into an interactive information and communication platform. At the core of this innovation is the integration of Quick Response (QR) codes and other digital technologies, which allow users to instantly access a wide range of information through smartphones. When scanned, the QR code can direct users to digital content related to mineral resources, tourism destinations, cultural heritage, agricultural opportunities, health services, educational resources, government services, investment opportunities, and local products. The technology can also provide real-time updates, multimedia content, e-commerce links, maps, promotional campaigns, and emergency or public awareness information, making the khanga a portable gateway to Tanzania's development agenda. By combining traditional textile craftsmanship with digital innovation, Smart Khanga has the potential to strengthen national branding, promote tourism and investment, support local industries, facilitate digital inclusion, enhance knowledge sharing, and create new economic opportunities for communities across the country. As a fusion of culture, technology, and entrepreneurship, Smart Khanga represents a sustainable and inclusive approach to accelerating socio-economic transformation while preserving Tanzania's rich cultural identity.

Keywords: *Smart Khanga, QR Code Technology, Mineral Wealth Promotion, Digital Transformation, Cultural Heritage, Investment Promotion, Textile Innovation, Digital Inclusion, Economic Development, Sustainable Development, Knowledge Dissemination, National Branding*

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6.4 College of Information and Communication Technologies (CoICT)

6.4.1 An AI-powered Fintech platform with integrated ERP for African Business management (ARENO)

Debora Jacob Lukki[1] and Nelukege Ndabila

Abstract

ARENO is an AI-powered fintech platform with an integrated Enterprise Resource Planning (ERP) system designed to transform business management across Africa through intelligent digital technology. The platform combines artificial intelligence, financial technology, and comprehensive business operations management into a single unified ecosystem that simplifies and automates organisational processes. Unlike conventional ERP systems that mainly function as data storage tools, ARENO operates as an intelligent business operating system capable of managing finance, human resources, operations, communications, and decision-making processes from a centralized dashboard. The platform integrates multiple business functions including real-time accounting, tax compliance, escrow payment services, operational management, branded communication systems, and AI-driven analytics. At the core of the system is Rafiki AI, an intelligent assistant that provides conversational support, operational auditing, predictive analytics, automated reporting, risk assessment, and workflow automation. Through machine learning and data-driven intelligence, the platform enables businesses to monitor performance in real time, forecast future trends, and automate repetitive tasks across human resources, payroll, customer relationship management, procurement, logistics, inventory, asset management, project management, and digital approvals — all operating through a shared data model that keeps every function continuously synchronised. ARENO is specifically designed to address the operational realities of African businesses by supporting multiple payment methods including mobile network operators, bank transfers, credit and debit cards, control number payments, and TanQR, while offering multi-currency capabilities to serve businesses operating across East African markets. By replacing traditional disconnected tools such as spreadsheets, accounting software, messaging applications, and paper-based systems with one integrated platform, ARENO enhances business coordination, financial transparency, and decision-making efficiency across all organisational levels. The platform serves a broad range of industries including construction, logistics, retail, financial services, real estate, healthcare, education, and hospitality, catering

1 Department of Electronics and Telecommunication Engineering

to startups, SMEs, and enterprises alike. Through intelligent automation and integrated fintech capabilities, ARENO contributes to the modernisation of African business ecosystems and supports sustainable economic growth through innovation-driven enterprise management

Keywords: *ARENO, AI, Fintech, Enterprise, Resource, Planning*

6.5 College of Natural and Applied Sciences (CoNAS)

6.5.1 Design and Development of a Smart LPG Monitoring and Leakage detection System

Nyamwenda James Musa[1], Aloyce A. Elias and Mohamed M. Mazunga

Abstract

Liquefied Petroleum Gas (LPG) is widely used as a domestic energy source because of its affordability, efficiency, and relatively low environmental impact. However, accurately monitoring the remaining gas level in LPG cylinders remains challenging, as conventional methods such as lifting, shaking, or estimating consumption are often unreliable and unsafe. Furthermore, undetected gas leakage poses serious safety hazards, including fires, explosions, property damage, and loss of life. This study aimed to design and implement a smart real-time LPG monitoring and leakage detection system capable of enhancing household safety and improving gas utilization efficiency. The developed system continuously measures the LPG level in a cylinder, calculates the percentage of gas remaining, and provides real-time user notifications through Short Message Service (SMS). Automated alerts are generated whenever the gas level decreases by 10%, while refill reminders are issued when the level reaches a critical threshold of 20%. In addition, the system detects gas leakage and immediately sends emergency warning notifications to users. System performance was evaluated through 70 experimental trials, including 30 gas-level measurement tests, 20 gas-leakage detection tests, and 20 SMS notification tests. Results showed an average gas-level measurement accuracy of 97.4%. The system successfully detected LPG leakage within 5–15 seconds, depending on gas concentration and environmental conditions, and achieved a 100% success rate in both leakage detection and SMS alert transmission. The findings demonstrate that the proposed system offers a reliable, low-cost, and accurate solution for real-time LPG monitoring and safety management. By reducing the risk of gas-

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related accidents, preventing unexpected gas depletion, and supporting efficient household energy management, the system provides a practical approach for improving LPG utilization in both domestic and commercial settings.

Keywords: *LPG, real-time monitoring, gas leakage detection, SMS notification, smart safety system, domestic energy management*

6.6 College of Social Sciences (CoSS)

6.6.1 Integrating Mental Health, Wellness and Psychotherapy with Nature-Based Interventions

Pascal Albert Laisangar[1]

Abstract

Mental health challenges such as depression, anxiety, stress, trauma, and substance abuse are increasingly affecting individuals and communities in Tanzania. Despite growing awareness of mental health issues, access to affordable, holistic, and culturally relevant mental health services remains limited. At the same time, research indicates that interaction with natural environments can enhance psychological well-being, reduce stress, and support recovery from mental health conditions. The Eco-Psychotherapy Village in Tanzania is proposed as an innovative initiative that integrates mental health care, wellness promotion, and psychotherapy within a therapeutic natural environment. The project aims to establish a center where individuals can access counselling, psychotherapy, mental health education, and wellness programs while benefiting from nature-based healing experiences. The village will feature counselling facilities, therapeutic gardens, mindfulness spaces, wellness areas, and research and training centers designed to promote emotional, psychological, and social well-being. The initiative is intended to serve diverse populations, including students, youth, professionals, veterans, religious leaders, retirees, and individuals experiencing mental health difficulties. In addition to service provision, the project seeks to advance research, professional training, and public awareness on the relationship between nature and mental health. By combining evidence-based psychotherapy with nature-assisted interventions, the Eco-Psychotherapy Village has the potential to improve mental health outcomes, strengthen resilience, and promote community well-being. As a pioneering model in Tanzania, the project offers a sustainable approach to advancing mental

1 Department of Sociology and Anthropology

health, wellness, and psychotherapy while contributing to the broader goal of improving quality of life.

Keywords: *Eco-Psychotherapy, Mental Health, Wellness, Psychotherapy, Nature-Based Interventions, Tanzania*

6.7 Dar es Salaam University College of Education (DUCE)

6.7.1 Computational Investigation of Xanomeline Analogues Targeting mAChR M1 for Schizophrenia Treatments

Anthony A. Tepeli[1], Yoshua B. Mtulo[2], Lucas Paul

Abstract

Schizophrenia is a chronic neuropsychiatric disorder characterized by cognitive impairment, negative symptoms, and psychosis, partly associated with disrupted cholinergic neurotransmission. The muscarinic acetylcholine receptor M1 (mAChR M1/CHRM1) has emerged as a promising therapeutic target because of its critical role in cognitive function and cortical signaling. This study employed an integrated computational approach to investigate xanomeline analogues as potential CHRM1 agonists for schizophrenia treatment. A library of xanomeline-derived compounds was screened using molecular docking, drug-likeness evaluation, ADMET prediction, molecular dynamics (MD) simulations, and free energy landscape (FEL) analysis. Docking results identified compounds A107 and A164 as the most promising candidates, exhibiting strong binding affinities of −7.42 and −7.08 kcal/mol, respectively. ADMET profiling revealed favorable pharmacokinetic characteristics, including high gastrointestinal absorption, blood–brain barrier permeability, acceptable toxicity profiles, and compliance with drug-likeness criteria. Molecular interaction analysis demonstrated that both compounds formed stable hydrophobic and π–π interactions with critical receptor residues, particularly TYR404, while A164 exhibited superior hydrogen-bond persistence. MD simulations over 200 ns showed enhanced structural stability of CHRM1 in the presence of the lead compounds, with reduced RMSD and RMSF fluctuations compared with the apo receptor. Furthermore, FEL analysis indicated that A164 stabilized the receptor in a dominant low-energy conformational state, suggesting improved

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thermodynamic stability and receptor engagement. Overall, the findings highlight A107 and A164 as promising lead molecules for the development of selective M1 receptor-targeted therapeutics and demonstrate the utility of computational drug discovery approaches in accelerating the identification of novel candidates for schizophrenia management.

Keywords: *Schizophrenia, Xanomeline Analogues, Muscarinic M1 Receptor (CHRM1), Molecular Docking, Molecular Dynamics Simulation, ADMET Profiling*

6.8 School of Aquatic Sciences and Fisheries Technology (SoAF)

6.8.1 Transforming Nile Perch (Lates niloticus) skin as an alternative for low-cost leather development

Abdulhamid K. Mussa[1] and Chacha Mwita

Abstract

The global fashion industry is increasingly shifting toward sustainable and environmentally friendly materials due to concerns associated with conventional leather production. Traditional leather tanning commonly involves chromium salts and other industrial chemicals that contribute to environmental pollution, ecosystem degradation, and health risks for workers. Fish skin has emerged as a promising alternative material for leather production. In Tanzania, large quantities of fish waste are generated from fish processing industries, especially from Nile perch (Lates niloticus). Most fish skins are discarded despite their strong collagen fiber structure, which makes them suitable for conversion into durable leather. This study focuses on transforming Nile perch skin into low-cost leather using traditional natural tanning methods. The study also explores the production of fashion accessories such as bracelets, watch straps, belts, and shoes from fish leather. Fish skins of Nile perch were collected from Ferry Fish Market (Kivukoni), Dar es Salaam. During transportation, the skins were preserved using ice and later stored in a refrigerator before processing. The tanning process involved the preparation of natural tannin solution using bark from mango tree (Mangifera indica) and neem tree (Azadirachta indica). The bark was chopped into small pieces and boiled in water for approximately 30 minutes to extract tannins. The solution was cooled and filtered before use. Fish skins were cleaned thoroughly by removing flesh and scales using sharp and dull

1 Department of Aquatic Science and Fisheries Technology

knives. The skins were then washed and softened using eggs mixed with water. After preparation, the skins were immersed in the tannin solution for 5–7 days, with regular turning to ensure even tanning. Additional tannin solution was added after two days to improve leather strength and durability. After tanning, the skins were shade-dried to prevent excessive stiffness and cracking. Oil was then applied to improve softness and flexibility. Final stretching was carried out manually to enhance elasticity and overall leather quality. The tanned fish leather was later used to produce bracelets, watch straps, belts, and shoes using local tools and manual stitching techniques. The tanning process successfully transformed Nile perch skin into usable leather with acceptable flexibility, strength, and appearance. The fish leather retained natural scale patterns that provided a unique aesthetic suitable for fashion products. The use of mango bark and neem bark produced effective tannin solutions capable of preserving and strengthening the fish skin. Prototype products including wallet, shoes sections were successfully produced. The products demonstrated that fish leather can be used as an alternative material for low-cost fashion accessories in Tanzania. The research contributes to waste reduction, environmental sustainability, value addition in fisheries resources, and local entrepreneurship development.

Keywords: *Tannin, fish skin, low-cost leather, natural, Nile perch*

6.9 School of Mines and Geosciences (SoMG)

6.9.1 Development of computational software tool for oil and gas industry

Geovan Gerald Mabiba[1] and Oras Joseph Mkinga

Abstract

The integration of digitalized systems into industrial activities has led to more efficient and accurate performance. The oil and gas industry is among the crucial sectors in the world and it requires efficient operations for the best acquisition of petroleum resources. Most of the operations undertaken in the oil and gas industry rely on mathematical calculations and analysis of several physical parameters that are obtained through computational procedures. There are different software tools that can be employed in different computations, but these have limitations as some of these are licensed software, some are open-source but can only be accessed online as websites, some are limited to

1 Department of Petroleum Science and Engineering

specific computations and others have strict hardware requirements. The oil and gas industry therefore requires a comprehensive computational tool that will encounter the highlighted limitations, a software tool that is open-source, a tool that is able to function offline, a mobile tool that can function on a computer or smartphone and finally a tool that can perform different computations in petroleum engineering; not limited to specific computations only. This project is generally aimed at developing an open-source, offline computational software for the petroleum-related computations. The specific objectives include; preparing a set of petroleum industry equations and their underlying computational logic, development of an open-source, offline, multiplatform computational software tool for different calculations in petroleum engineering and finally testing the functionality of the software and accuracy of results it provides. The literature review was intended to prepare a set of petroleum engineering equations and computational procedures to be employed in the development as well as determine the best approach and tools to be employed. A general software development lifecycle that includes requirement analysis, system design, implementation, testing and maintenance has been determined as the best approach and the best tools to be employed include Flutter framework, Dart programming language and Firebase backend services. The project is expected to employ a research and developmental approach to ensure a better version of the software intended is obtained. It consists of three methodologies; preparing set of petroleum engineering equations from literature review, software development employing the prepared set of equations and testing the functionality of the software and accuracy of results using already calculated problems or comparison with manual solutions. Expected results from this project are software installation kits for Android and Windows platforms.

Keywords: *Oil, Gas, Software, Computation*

6.10 University of Dar es Salaam Computing Center (UCC)

6.10.1 Fika App: Offline-First Smart Mobility and Location Intelligence System

Gerald Ndyamukama[1] and Obedy Kamanjenzi

Abstract

The increasing need for efficient workforce monitoring, attendance management, and operational visibility across multiple locations has exposed major challenges associated with manual attendance systems, unreliable reporting, connectivity limitations, and inefficient workforce coordination. Bridging this gap, the FiKa App was introduced as an innovative offline first, location-aware mobile attendance and workforce monitoring system designed to automate attendance recording and workforce tracking without requiring manual user interaction. The system intelligently detects user presence through mobile device location awareness and automatically synchronizes attendance and monitoring records once internet connectivity becomes available. This approach enables organizations operating in low-connectivity or remote environments to maintain continuous workforce visibility and operational monitoring without interruption. FiKa App integrates modern geolocation technologies, intelligent automation, and real-time monitoring capabilities to improve workforce accountability, mobility management, and institutional efficiency. The platform provides automated attendance recording using location awareness, eliminating the need for manual check-ins and reducing opportunities for attendance fraud, manipulation, delays, and human error. Through its offline-first functionality with synchronization capabilities, the system ensures uninterrupted operation even in environments with unstable or unavailable internet connectivity. The platform further incorporates real-time location tracking and monitoring, enabling organizations to monitor staff movement, operational activities, and workforce deployment across multiple locations. In addition, the system provides smart routing and navigation functionalities that optimize movement coordination and improve operational efficiency, particularly for organizations with field operations and transport services. To strengthen monitoring and security, FiKa App supports geo-fencing and automated alerts, enabling institutions to define authorized operational zones and receive notifications when users enter or leave designated areas. The system also facilitates transport coordination and monitoring, supporting logistics operations, institutional transportation services, and mobile workforce management. Furthermore, FiKa App includes workforce monitoring

1 Software Engineering Department, University of Dar Es Salaam Computing Centre

across multiple operational sites and real time attendance reporting and analytics, providing organizations with actionable insights for operational planning, performance evaluation, and data-driven decision-making. The analytics dashboard enhances institutional oversight by presenting real-time reports and location intelligence information in a centralized and accessible format. The innovation is highly relevant to universities and educational institutions, government agencies, corporations with distributed operations, logistics and transport companies, healthcare and utility service providers, security firms, construction and manufacturing industries, NGOs, research organizations, and smart city initiatives seeking efficient workforce and mobility management solutions. Since its development, FiKa App has contributed significantly to society by improving attendance accuracy, workforce accountability, and operational transparency through automated location based attendance recording. The system reduces administrative workload and operational costs associated with manual systems while improving organizational efficiency and productivity through intelligent automation and real-time monitoring capabilities. Additionally, the platform enhances workforce visibility, safety, and security through presence tracking, geo-fencing technologies, and location intelligence services. By supporting organizations operating in low-connectivity environments, FiKa App promotes digital inclusion and operational continuity in underserved and remote areas. The system also enables faster and smarter decision-making through real-time reporting, analytics, and monitoring insights. Through the integration of location intelligence, intelligent automation, offline-first architecture, and workforce monitoring technologies, FiKa App provides an innovative, scalable, and sustainable solution capable of transforming attendance management, operational coordination, and smart workforce monitoring in modern institutions and organizations.

Keywords: *FiKa App, Smart Mobility, Location Intelligence, GPS Tracking, Real-Time Reporting, Attendance Automation, Remote Workforce Monitoring*

6.11 Mbeya College of Health and Allied Sciences (MCHAS)

6.11.1 Development of Lumina: An AI-integrated, Low-Cost Vein Finder for Difficult Venous Access in Low-Resource Settings

Christopher R. Mselem [1], Joseph L. George , Vincent J. Chambo

Abstract

Introduction: Peripheral intravenous access remains challenging in neonates, elderly, obese, and dark-skinned patients, with first-attempt failure rates reaching 30% in adults and up to 64% in children. This leads to increased pain, treatment delays, higher complication rates, and wasted resources. In Tanzanian hospitals, approximately 80% of inpatients require intravenous access, and the available commercial vein finders are largely inaccessible due to high price (costing TZS 9 to 70 million), bulky, and some require highly trained staff. This project aims to develop Lumina, a highly efficient, portable and affordable vein finder priced below 3 million TZS tailored for low-resource Tanzanian settings.

Methods: The device uses non-ionizing light and a sensor system to detect subcutaneous veins. A microprocessor applies AI-trained algorithms optimized for dark skin tones, while a built-in projection system displays the real time vein map directly onto the patient's skin, enabling hands free cannulation.

Results: Imaging combined with algorithm is projected to achieve 85–95% vein visualization success across obese, pediatric, elderly, and dark-skinned cohorts. This is supported by a 2025 Algorithm-based study that reported 94% accuracy across all skin types. The device is expected to significantly reduce cannulation failures, procedure time, complications, and material wastage.

Conclusion: Lumina aligns with Tanzania's Ministry of Health priorities and the 2025/26 national health budget allocation of 6.7 billion TZS for technology. It also supports the RIW's theme of harnessing technologies for Universal Health Coverage. Although the full design, specifications, and algorithms are complete on paper, prototype development has not yet started due to lack of funding. Securing funding will enable rapid prototyping, clinical validation, TMDA regulatory clearance, and scaling for East African markets.

Keywords: *Lumina, AI, Vein, Resource*

1 Mbeya College of Health and Allied Sciences, University of Dar es Salaam, Mbeya, Tanzania

6.12 Mkwawa University College of Education (MUCE)

6.12.1 Development of ulvan bioplastics incorporated with deacetylated chitin nanofibrils for food packaging

Monica Mrimi Maihagi[1], Fednand Cosmas Kindole, Hassan kalilo, Elianaso Elimbizi

Abstract

Globally, ~ 400 million tons of plastic wastes are generated annually with only 10% being recycled, on other hand ~ 23.8 million tons of marine and aquatic biomass (sea weeds and crab shells) are being discarded annually across the supply chain. This creates severe environmental pressure on terrestrial and marine ecosystems. The marine biomasses (sea weeds and crab shells) are considered to be rich in chitin and ulvan polysaccharides that can be converted into high value, eco-friendly products. This research aimed to develop biodegradable ulvan-based composite bioplastic reinforced with chitin Nano fibrils (ChNFs) and evaluate their physicochemical properties for potential food application. Ulvan bioplastics were fabricated using solvent casting method with glycerol as plasticizer. The resulting bioplastics were characterized in terms of moisture content, degree of swelling, water solubility, thickness and visual appearance. Incorporation of chitin Nano fibrils (ChNFs) significantly improved the water resistance of the bioplastic as evidenced by reduction in moisture content to 14.6%, bioplastics thickness generally decreased to 0.070 mm, indicating formation of more compact polymer network. Enhanced transparency and uniformity of the bioplastics further suggested the improved compatibility between ulvan and ChNFs. These findings demonstrate that ChNFs effectively reinforce ulvan bioplastics by promoting intermolecular interactions and reducing hydrophilicity nature of ulvan polysaccharides. The practical utility of the developed bioplastics was validated through 15-day real-food storage application trio evaluating its efficiency in preserving fresh green chili peppers against conversional polyethylene (PE) and unwrapped control. The bioplastics demonstrated exceptional performance as an active packaging g materials, maintaining structural integrity and vibrant green coloration of the products. While control and PE wrapped sample exhibited progressive moisture loss, severe shriveling and dramatic color degradation. This superior preservation capability is attributed to synergistic properties of high durable, transparent and water proof composite matrix of bioplastic. Furthermore, the integration of ChNFs provided vital antimicrobial properties that offers active protection

1 Mkwawa University College of Education

against foodborne pathogens, thereby mitigating food spoilage and significantly extended shelf life by serving as full-biodegradable and eco-friendly alternative to petroleum based polymers.

Keywords: *Ulvan, Chitin Nano fibrils, Biodegradable bioplastics, Active food packaging, Marine biomass, water resistance, sustainable materials, shelf life extension, antimicrobial protection*

6.13 Institute of Marine Sciences (IMS)

6.13.1 The Potential of Emperor Fish Scales (Lethrinus harak) in the Synthesis of Nanohydroxyapatite for Heavy Metals and Nutrient Remediation from Wastewater in Zanzibar

Elisha Leonard[1] and Juma Twaha

Abstract

Water pollution from mining & industrial effluents containing hazardous heavy metals like Chromium, Lead, copper, Cadmium and excess nutrients (nitrates and phosphates) is a major global concern. In Tanzania most of mining & industrial effluents remain untreated and are always directed toward the natural environment which is risky. Simultaneously emperor fish scales carry a valuable mineral of calcium phosphate, commonly in the form of hydroxyapatite ($Ca_{10}(PO_4)_6(OH)_2$), that can be extracted from the scales by using alkaline treatment-calcination method. Therefore, this study aimed to synthesize nanohydroxyapatite minerals for heavy metals and excess nutrients remediation from wastewater. Extraction of nanohydroxyapatite minerals from emperor fish scales and adsorption test was done. XRF analysis confirmed the presence of both CaO and P_2O_5 key precursors of hydroxyapatite with Ca/P ratio of 2.5 confirmed successful production of biogenic nanohydroxyapatite from fish scales. XRD analysis of nanohydroxyapatite showed sharp and intense diffraction peaks confirming a significant improvement in crystallinity after synthesis with diffraction peaks corresponding closely with standard hydroxyapatite pattern indexed in ICDD card No. 00-009-0432 for hexagonal hydroxyapatite compared to the XRD pattern of raw fish scales. Furthermore, a noticeable color change from dark to colorless was observed when contaminated water was treated with the nanohydroxyapatite indicating a successful removal of contaminants in wastewater (heavy metals and nutrients). Therefore, these findings demonstrate

1 Institute of Marine Science

that fish scale derived nanohydroxyapatite can serve as affordable, sustainable & eco-friendly material for wastewater treatment in mining and industrial effluents as well as supporting waste recycling and environmental sustainability.

Keywords: *Emperor Fish Scales, Nanohydroxyapatite, Excess nutrients, Heavy metals, Wastewater treatment, XRD & XRF*

7 CATEGORY 7: AWARD FOR THE OUTSTANDING STRATEGIC TRANSFORMATION PROJECT OF THE YEAR

7.1 College of Engineering and Technology (CoET)

7.1.1 Twine wind turbine (Cascade): A scalable solution for clean energy in Tanzania

Lusajo Mwamakula[1],

Abstract

The Green Project introduces a highly efficient twin (Cascade) turbine designed to address a gap in East Africa's renewable Energy sector, targeting affordable, locally manufactured wind technology. This project is intended to reduce the dependency on expensive imported wind turbines' technology, which cost up to 80% more due to high importation duty and VAT. The design aims to operate in a moderate wind speed from 1.5m/s to 7.5m/s in Tanzania and East Africa. It minimizes mechanical complexity to maximize power efficiency. The project prioritizes locally sourced materials and fabrication techniques. The pilot demonstrates good performance ability, generating power at low cut in wind speed of less than 2m/s proving that green energy can be obtained in low wind conditions. Manufacturing initially 10 units, the project establishes a sustainable blueprint for rural electrification and youth's employment in Tanzania. The deployment of these affordable units positioned to support community including healthcare and agro processing, while reducing national carbon emissions. To ensure widespread adoption among small scale farmers and small to medium enterprises (SMEs), the study recommends partnering with financial institutions to offer Green Micro loans, providing accessible pathway towards Tanzania and East Africa's transition to Sustainable green Economy.

Keywords: *Green, Wind, Turbine, Solution.*

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7.2 College of Information and Communication Technologies (CoICT)

7.2.1 Formalizing Tanzania's Community health workforce: integrating CHWs into the national HRHIS

Honest Kimaro[1]

Abstract

The formalization of Community Health Workers (CHWs) in Tanzania created a need to integrate this workforce into the national Human Resources for Health Information System (HRHIS), as CHWs had previously operated outside the official registry. Leveraging the recently DHIS2-enabled HRHIS, the system was enhanced to support end-to-end CHW management, including recruitment, training, certification, deployment, performance monitoring, and stipend management. Using DHIS2 tracker functionality and custom web applications, the CHW workflow was digitized and integrated with other national systems, including the Unified Community System (UCS) for community activity reporting and the Facility Financial Accounting and Reporting System (FFARS) for stipend disbursement. Through these integrations, CHW records are automatically synchronized across systems, enabling seamless reporting, payment processing, and feedback management. The enhanced HRHIS now provides real-time visibility into the CHW workforce through dashboards and analytics that track nomination, training completion, deployment status, refresher needs, and regional coverage. Integration with UCS links outreach activities directly to CHW profiles, enabling performance tracking, while FFARS integration ensures timely and accurate stipend payments. The initiative has transformed previously unregistered community workers into fully recognized members of the national health workforce, improving accountability, supervision, and workforce planning. This experience demonstrates how DHIS2-based digital public infrastructure can strengthen the integration of community health programs into formal health systems, creating efficient, transparent, and scalable workflows for frontline health workers in even the most remote settings.

Keywords: *Community Health Workers, HRHIS, Digital Health, Health Workforce Management, Community Health Systems, Digital Public Infrastructure*

1 Department of Computer Science and Engineering

7.3 College of Natural and Applied Sciences (CoNAS)

7.3.1 Duracem and Duracem 1A stabilized Cold asphalt mix for sustainable road construction

Makungu Madirisha[1], Geradius D. Kikumi, Regina P. Mtei, Evalina E. Samba, and Jasson M. Kaijage

Abstract

Road construction remains one of the most energy-intensive infrastructure activities, contributing significantly to fuel consumption, greenhouse gas emissions, and lifecycle maintenance costs. To address these challenges, the project developed Duracem and Duracem 1A, two innovative technologies for sustainable road infrastructure development. Duracem is a low-carbon binder designed for pavement concrete applications, including rigid pavements and lean concrete bases, while Duracem 1A is an advanced stabilizer developed to enhance the performance of cold-mix asphalt. The technologies were developed through a collaborative research and innovation programme between the Department of Chemistry at the University of Dar es Salaam and Starpeco Company Limited, with Starpeco playing a key role in field deployment, validation, and practical implementation. In addition to generating innovative road construction technologies, the project contributed to human-capacity development through the active involvement of two young scientists, Mr. Jasson M. Kaijage and Ms. Evalina E. Samba, who participated in technology development, laboratory evaluation, field validation, and innovation deployment activities. Duracem improves strength development, durability, and resistance to environmental degradation, providing a sustainable alternative for pavement concrete construction. Duracem 1A addresses key limitations of cold-mix asphalt, including slow strength development, moisture susceptibility, and reduced resistance to traffic-induced distress. Laboratory investigations demonstrated significant improvements in mechanical strength, stability, cohesion, moisture resistance, load-bearing capacity, and resistance to rutting, stripping, cracking, and permanent deformation. These enhanced performance characteristics make the technologies suitable for road construction, rehabilitation, and maintenance applications. A major achievement of the project is the successful transition from laboratory research to field deployment through a strong academia–industry partnership. Real-world applications have demonstrated the technical feasibility, scalability, and commercialization potential of both technologies,

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providing a practical pathway for technology transfer and adoption within the road construction sector. Collectively, Duracem and Duracem 1A reduce energy consumption, lower greenhouse gas emissions, decrease construction and maintenance costs, and reduce dependence on imported construction additives. The technologies promote local innovation, industrial development, and value addition while supporting low-carbon and climate-resilient infrastructure systems. The project demonstrates the transformative role of chemistry-driven innovation and university–industry collaboration in advancing sustainable infrastructure development, technology commercialization, and socio-economic transformation in Tanzania and beyond.

Keywords: *Duracem; Duracem 1A; Sustainable Road Infrastructure; Pavement Concrete; Cold-Mix Asphalt; Low-Carbon Technologies*

7.4 College of Social Sciences (CoSS)

7.4.1 Longing for Children: Masculinity and Assisted Reproductive Technologies in Tanzania

Simon Mutebi[1],[2]

Abstract

Since the early 2000s, scholars have increasingly focused on men, masculinity, and reproduction worldwide. Although a substantial and growing body of literature now examines these themes, some researchers continue to position men at the margins of reproductive studies. Public health and medical scholarship, in particular, often reinforces this marginalization by portraying men as having negative influences on women's reproductive health and as individuals who avoid treatment or fail to comply with medical diagnoses and infertility care. While such patterns exist, these portrayals frequently overlook men who are actively striving to become fathers in the era of assisted reproductive technologies (ARTs). Drawing on ethnographic research in Dar es Salaam, I show that longing fathers willingly accept and actively engage with assisted reproductive technologies in their pursuit of fatherhood. I argue that aspiring fathers express their longing for children in ways that demonstrate how hegemonic forms of masculinity related to fathering children motivates

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their engagement with reproductive technologies. This perspective on men, masculinity, and reproduction underscores how men in urban Tanzania navigate infertility concerns.

Keywords: *Fatherhood, Masculinity, Longing, Reproductive technologies, Infertility, Tanzania*

7.5 Dar es Salaam University College of Education (DUCE)

7.5.1 Breaking the cycle of adversity – evaluating the effects of a randomized intervention for Congolese refugees (WEMA)

Mabula George Nkuba[1], Masath, F.B.[2], Nordenving, S.[3], Gredebäck, G.[2], Hoeffler, A.[4], Nyström, H., Scharpf, F.[5],[6] Vassiliou, P.T.B.[2], Walsh, J.I.[7], Hecker, T and Hall, J.

Abstract

The mental health challenges faced by refugee children are exacerbated by parental psychological distress and adverse parenting behaviors. The WEMA trial (Kiswahili: "kindness")—Wellbeing through combined evidence-based tools for Mental health and Attuned parenting—investigates the impact on child well-being of treating parental mental health problems alone (with the WHO endorsed Self-Help Plus [SH+] mental health program) and in combination with improved parenting tools (the Interaction Competencies with Children – for Parents [ICC-P]) in a Tanzanian refugee camp. A three-arm randomized controlled superiority trial (allocation ratio 1:1:1) with 324 sibling pairs (648 children) and their two principal caregivers will assess the impact on the primary outcome of child emotional and behavioral problems (Pediatric Symptom Checklist-17) at 12 months post-intervention. We hypothesize that children whose parents

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received SH+ alone display fewer emotional and behavioral problems compared to the control group, and that children in the arm with dual interventions display even greater improvements. Analyses will follow an intention-to-treat approach, adjusting for clustering and relevant covariates. This study will shed light on the role of parental mental health and parenting for children's mental health and well-being, evaluating the efficacy of scalable, cost-effective interventions in a refugee setting.

Keywords: *Mental Health, Child Development, Parenting, RCT, Refugees, Self-Help Plus, Interaction Competencies with Children – For Parents, Tanzania*

7.6 School of Journalism and Mass Communication (SJMC)

7.6.1 SKN Research Compass

Sophia Kokugonza Ndibalema[1]

Abstract

Postgraduate research training in African universities operates under a persistent structural strain: rising student enrolments against limited supervision capacity, scattered and often decontextualised learning resources, and high attrition at the proposal and methodology stages. Students rarely struggle because they lack ability; they struggle because the guidance available to them is fragmented across textbooks, supervisors' offices, and late-night searches, and is seldom grounded in the African research environment in which their studies actually take place. SKN Research Compass was developed as a digital innovation to address this gap. It is an adaptive online learning platform that walks postgraduate researchers in Public Relations, Corporate Social Responsibility Communications, Strategic Communication, and Media Studies through the full research journey — from understanding research and choosing a topic, through problem framing, theoretical and conceptual frameworks, methodology, data collection and analysis, to writing, presenting, and research ethics. The platform integrates ten structured learning modules, twenty-four theoretical frameworks with applied guidance, a curated reference library, and interactive practice tools including a Problem Statement Builder, a Methodology Selector, and a Master Quiz. Examples and case material are deliberately drawn from the Tanzanian and East African contexts, and modules are paired with examiner-perspective

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notes on common mistakes and how to avoid them. The platform is accessible by subscription with a seven-day free trial, and complements rather than replaces formal supervision. Early student response has been positive, indicating that the platform reduces the foundational burden on supervisors and supports more confident, self-directed research practice. Planned developments include accessibility features for learners with disabilities, a dedicated repository to amplify African scholarship published in local and regional journals that currently lack visibility, an open channel for academics to share their Africa-focused research with postgraduate audiences, and expansion to additional disciplines in response to demand positioning the platform as a scalable infrastructure for democratizing postgraduate research training across African higher education.

Keywords: *Postgraduate Research Training, Adaptive Learning, Digital Innovation, African Scholarship, Inclusive Education, Research Supervision*

7.7 University of Dar es Salaam School of Economics (UDSE)

7.7.1 Inclusive Green Economy (IGE) in Practice for senior civil servants and policy makers

Martin Chegere[1], Aloyce Hepelwa , Wilhelm Ngasamiaku, Rosemary Taylor, Gerald Kibira and Salvatory Macha

Abstract

The Inclusive Green Economy (IGE) Capacity Development Program is a regional initiative to strengthen national capacities for sustainable economic transformation in line with Agenda 2030, particularly Sustainable Development Goal 8: Decent work and sustainable economic growth. The program equips senior civil servants and policy makers with the knowledge and skills to apply economic policy instruments to foster organizational change, and promote evidence-based policymaking for poverty reduction, environmental management, and climate resilience. The main objective of the programme is to strengthen country capacity for transformation towards an Inclusive Green Economy in Eastern African (Tanzania, Kenya, Uganda, Rwanda and Ethiopia) faced with major environmental, economic and social challenges. These economies require transformation to meet their citizens' social and economic needs without yielding unsustainable environmental impacts. The IGE programme

1 School of Economics University of Dar es Salaam

contributes to the transformation towards economic sustainability, through new approaches and tools developed together between researchers and policy makers through capacity building lens. IGE is a capacity building programme where civil servants are trained on the use of economic policy instruments to achieve green or sustainable development. The programme features in five green sensitive sectors – energy, agriculture, water, natural resources and finance. It is a collaborative programme focusing on engaging academics and policy makers in specifying needed policy reform to accelerate growth in the programme countries. On yearly basis, 25 civil servants (5 per country) are recruited (as IGE fellows) to work together with researchers in identifying policy reforms needed and provide relevant policy reform guide (policy solutions) for achieving sustainable economic growth goals. The innovation in this programme is the engagement of both researchers and policy makers in policy reform development cycle which include matching IGE Policy needs with scientific evidence, stakeholder dialogues, mapping key organizations, recruiting senior civil servants (IGE fellows) and development of theme specific transformation initiative (TI) and facilitating peer learning and experience sharing among researchers and IGE fellows across programme countries. IGE fellows are trained on the use economic policy instruments and are engaged practically in carrying out a step-by-step assessment of policy reform pathways. The IGE framework called transformation initiative (TI) is adopted in establishing the evidence-based policy solution for the green development. In year 2024, the policy reform theme was on "energy efficiency and reduced emission" and in year 2025, the policy reform focused on "Climate Smart Agriculture". Both themes, IGE fellows and researchers from the implementing countries have developed transformation initiatives (TIs) relevant to bring green development. Technological advancements, capacity building and policy incentives are thus key to the successful development and application of policy reforms guides for energy-efficient and climate smart agriculture practices. These practices are not only important in reducing operational costs and environmental degradation but could also go a long way in creating green jobs opportunities. For 2024, Researchers(4) and IGE follow (5) worked on TI challenge on promoting the use of energy-efficient technologies in Tanzania: the case of domestic appliances with the objective enhancing energy efficiency and reduced emissions. UDSM research staff worked together with IGE follows from Ministry of Energy, Ministry of Industries and Trade, Ministry of finance and REA and developed policy reform guide important for promoting the use of energy efficient technologies in domestic appliance to enhance energy efficiency and reduced emissions. In 2025, UDSM staff (4) and IGE fellows (5) from Ministry of Agriculture, Vice Presidents' office, Ministry of livestock and fisheries and

Ministry of finance are developing policy reform guide to accelerate adoption of climate smart irrigation technologies by smallholder farmers. Training, Peer learning and experience sharing among participating countries undertaken to enrich development of policy reform guideline/solution to the TI in place.

Keywords: *Inclusive Green Economy, Civil Service Capacity Building, Transformation Initiatives, Peer Learning, Climate Resilience, Sustainable Development Goals*

7.8 Mbeya College of Health and Allied Sciences (MCHAS)

7.8.1 The use of childbirth experience questionnaire (CEQ) and Birth Satisfaction Scale-Revised (BSS-R) in comparing the experiences of mothers with and without HIV in Tanzania

Bernard Mbwele[1],[2] Zablon Zakayo Joctani, Claudia Hawkins[3], Matthew Caputo[3], Furaha August[4], Sylvia Kaaya[5], Erasto V. Mbugi[6], Lisa R. Hirschhorn[3], Patricia D. Franklin[7]

Abstract

Introduction: Mothers' experiences at birth and respectful maternal care are critical to achieving Sustainable Development Goal number 3 in Tanzania. However, little is known about the differences in peri-natal experience quality between women with and without HIV. To address this gap, we compared mothers' experience at birth among women with and without HIV.

Methods: This cross-sectional study was conducted in four (4) Reproductive and Child Health (RCH) Clinics in Mbeya, Tanzania between June - August, 2022. Childbirth experience was assessed among mothers with and without HIV one week after birth using the Child Birth Experience (CEQ) and Birth Satisfaction Scale-Revised (BSS-R) questionnaires translated to Swahili. Higher scores reflected better experiences. Using this baseline assessment, bivariate and multivariate linear regression analyses tested the associations between HIV status and other patient factors and child-birth experience scores.

Results: A total of 1,252 mothers were invited of which 626 [288 (46%) with

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HIV, mean (standard deviation (SD) age 31.9 ± 7.8 years)], were included. Mothers with HIV had lower scores in most CEQ and BSS-R domains compared to mothers without HIV. Significant mean CEQ score differences between mothers with and without HIV were observed in both CEQ and BSS-R scores: After adjusting for demographic factors, regression coefficients, β for CEQ scores were higher among mothers without HIV compared to mothers with HIV. for: "Own capacity" 0.73, p<0.001, "Professional support" 0.94, p<0.001, and "Participation" 0.33, p <0.001. Similarly, β for BSS-R scores were higher among mothers without HIV for "Quality of care provision" 0.87, p<0.001), "Women's personal attributes 0.27, p=0.002, and "Stress experienced" 0.1, p=0.1.

Conclusion: Mothers with HIV in the postpartum period reported poorer CEQ and BSS-R scores compared to mothers without HIV. These results suggest a need to improve respectful maternity care at birth among the mothers with HIV.

Keywords: *Childbirth, HIV, Experience, Mothers*

7.9 Mkwawa University College of Education (MUCE)

7.9.1 HematoAI: An Explainable Molecular AI Platform for Transforming Leukemia Drug Discovery

Anthony Peter[1] and Sarah Profess[2]

Abstract

Acute myeloid leukemia (AML) is an aggressive hematological malignancy driven by dysregulation of the menin (MEN1)-mixed lineage leukemia (KMT2A/MLL) interaction. Although this pathway has been clinically validated by revumenib, its therapeutic landscape remains limited by emerging resistance, constrained inhibitor diversity, and a narrow therapeutic window associated with dose-limiting proarrhythmic risk. In addition, the menin-MLL interface presents intrinsic draggability challenges due to its shallow, flexible, and dynamic binding pocket, which limits the effectiveness of conventional structure-based drug design. Traditional drug discovery pipelines remain costly, time-intensive (10-15 years), and resource-demanding, with estimated development costs ranging from 944 million to 4.54 billion US dollars per oncology drug and low hit rates from large chemical libraries. These constraints are more severe in low-resource settings, where limited laboratory infrastructure,

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funding, and access to advanced computational tools restrict innovation, despite rich and underexploited medicinal plant biodiversity, particularly in Tanzania. Furthermore, pharmaceutical education in Tanzania remains largely theoretical, with limited exposure to practical AI-enabled computational tools, thereby constraining the development of skilled professionals capable of accelerating modern drug discovery. To address these challenges, we developed HematoAI, an explainable artificial intelligence (XAI) platform that integrates quantitative structure–activity relationship (QSAR) modeling with machine learning to accelerate early-stage leukemia drug discovery while simultaneously supporting digital capacity building in molecular sciences. The system was developed using curated chemical datasets, molecular fingerprint representation, and structured model training and validation procedures. The final model achieved strong predictive performance ($Q^2 = 0.862$; external $R^2 = 0.847$), demonstrating robust predictive capability consistent with OECD QSAR validation principles. Explainable AI analysis identified key molecular determinants governing inhibitory activity, enabling mechanistic interpretation of structure-activity relationships (SAR). Specifically, fluorine substitution, aromatic scaffolds, extended hydrophobic carbon frameworks (≥32 carbons), hydrogen-bonding functional motifs, heteroatom-rich fragments, and nitrogen-containing linkers were associated with enhanced activity, suggesting favourable contributions to target binding affinity and molecular recognition. In contrast, nitrile groups exhibited a consistent negative contribution, likely reflecting reduced compatibility with the binding environment and weakened interaction potential within the active site. External experimental validation using a fluorescence polarization binding assay involving 100 structurally diverse compounds further confirmed the model's predictive robustness within chemically challenging space ($R^2 = 0.783$). HematoAI is deployed as an interactive web platform enabling virtual screening, molecular optimization, and batch prediction through simple SMILES input and Molecular drawing. Therefore, HematoAI provides a scalable and sustainable digital framework that reduces reliance on costly laboratory screening, accelerates drug discovery, minimizes chemical waste, and bridges the gap between theoretical education and practical computational drug design. The platform supports biomedical innovation, research capacity development, and digital transformation in pharmaceutical sciences.

Keywords: *Leukemia, Drug, Dose, Cost, Resources*

7.10 Institute of Marine Sciences (IMS)

7.10.1 Deep-sea Mining Potential in Tanzania's EEZ: Free-Air Gravity Anomalies and Seafloor Geomorphology

Thomas Paschal[1], Desiderius Masalu, Rachel Sabuni and Emmanuel Agwanda

Abstract

Tanzania's Exclusive Economic Zone (EEZ) remains sparsely constrained by integrated marine geophysical observations, limiting EEZ-scale interpretation of offshore structure and geomorphic setting. This study investigated the spatial distribution of free air gravity anomalies and their quantitative relationship with seafloor geomorphology in the Tanzania EEZ using satellite-altimetry-derived gravity, shipborne gravity observations, and GEBCO 2023 bathymetry. Gravity datasets were merged, gridded, clipped to the EEZ boundary. The processed data were then analysed using descriptive statistics, non-parametric tests, spectral analysis, and Spearman rank correlation with bathymetric depth, slope, and profile curvature. The mapped gravity field is dominated by negative anomalies, ranging from -111.14 to 66.67 mGal, with strong spatial variability across the EEZ. Statistical comparison revealed significant differences in gravity distributions among geomorphic features ($p < 0.05$), with the depression exhibiting the most negative anomaly field (median = -80.22 mGal), while Davie ridge and the newly identified seamount occupied the least negative end of the spectrum (median = -20.52 and -21.55 mGal, respectively). Spectral analysis resolved two principal source ensembles at 14.29 ± 1.52 km and 5.56 ± 0.69 km, indicating that the gravity field contains both deeper regional and shallower superposed crustal components. Bathymetric depth emerged as the primary predictor of free air gravity anomalies, with positive depth-gravity relationships over the depression ($\rho = 0.7485$), seamounts ($\rho = 0.9125$ and 0.8321), and Davie ridge ($\rho = 0.6972$), whereas negative correlations occurred over the abyssal plain ($\rho = -0.7413$) and canyons ($\rho = -0.1040$). In contrast, slope was weaker and profile curvature was the least stable predictor. These feature-specific relationships demonstrate that the Tanzania EEZ gravity field reflects uncompensated and partially compensated topography, crustal density variations, and isostatic compensation mechanisms rather than simple bathymetric control. The study provides a regional geophysical baseline for tectonic interpretation, resource reconnaissance, and prioritization of future shipborne gravity, multibeam bathymetry, seismic, and magnetic surveys in the Tanzania EEZ.

Keywords: *Tanzania EEZ; free air gravity anomalies; bathymetry; geomorphology; marine geophysics; Davie ridge*

1 University of Dar es Salaam, Institute of Marine Sciences (IMS)

8 CATEGORY 8: AWARD FOR THE BEST UNIVERSITY - INDUSTRY PARTNERSHIP PROJECT OF THE YEAR

8.1 College of Engineering and Technology (CoET)

8.1.1 Producing industry-ready geomatics professionals through industry linkage: Experience from the University of Dar es Salaam

Julian Ijumulana[1], Alex Lubida, Joseph Mango and Lilian Kato

Abstract

The Geomatics Programme at the University of Dar es Salaam has, since 2015, implemented an innovative industry-linked training model to produce industry- ready professionals. The approach integrates classroom learning with structured field based training in collaboration with planning authorities and government agencies, strengthening the link between academia, industry, and practice while addressing national development needs. The model aligns with Tanzania's development vision, DIRA 2050, which emphasizes sustainable infrastructure, efficient land administration, and digital transformation. Through partnerships with Kibaha District Council, Dodoma City Council, Ruangwa District Council, and Mkinga District Council, third-year students establish control points. In contrast, second-year students use them for cadastral surveying and plot demarcation for development. This integrated system enhances technical continuity and supports land administration processes. In collaboration with Tanzania Rural and Urban Roads Agency, Ubungo Municipal Council, and Kinondoni Municipal Council, fourth-year students conduct engineering surveying and road design. They establish control networks, collect road profiles and cross-sections, map physical features, and design roads using GIS, engineering software, and open-source tools. This model equips students with practical competencies, digital skills, and professional readiness while contributing directly to infrastructure development. It demonstrates a sustainable framework for producing graduates capable of supporting the implementation of DIRA 2050 through improved geospatial and engineering capacity.

Keywords: *Geomatics Education; Industry Linkages; Practical Training; DIRA 2050; Industry-Ready Professionals.*

1 Department of Transportation and Geotechnical Engineering

8.2 College of Natural and Applied Sciences (CoNAS)

8.2.1 Robotics Bootcamp in Tanzania for STEM Capacity Building and Innovation Development

Eva Shana[1], Hezekia Sawa, Gilya Sungi, Hashim Rajabu, Lamsi Safari, Joel Ngushwa[2] , Bernrad Kikr[3], Bahta Bekel[4], Thomas Kuran.

Abstract

The Robotics Bootcamp Tanzania initiative was established in 2022 under the Department of Physics, University of Dar es Salaam (UDSM), in collaboration with World Robot Olympiad (WRO) Tanzania and industrial partners to strengthen STEM education, robotics innovation, coding skills, and digital transformation among Tanzanian students. The initiative aims to provide practical and inclusive robotics training through bootcamps, competitions, and mentorship programs targeting students from both public and private schools aged 8–19 years. Since its establishment, the project has successfully organized three robotics bootcamps (2022, 2024, and 2025) and two National and International Robotics Olympiads (2024 and 2025). A total of 935 students, including 150 students with special needs, have been trained in robotics and coding across multiple regions in Tanzania. The project has enabled Tanzanian schools to participate in the World Robot Olympiad International Finals, where Jangwani Girls Secondary School represented Tanzania in Turkey (2024) and Azania Boys Secondary School qualified for Singapore (2025). Furthermore, the initiative received international recognition through collaboration with WRO Learn and Aramco under the Growing Future Innovators Program, securing additional support for teacher and facilitator training in July 2026 attracting 5000€ from WRO . Building on these achievements, the project plans to expand robotics training to more than 3,000 students and 300 teachers across Tanzania, including young learners aged 8 13 years at the primary school level. The initiative contributes significantly to promoting innovation, teamwork, problem-solving skills, and technological capacity building, which are essential for Tanzania's industrialization agenda and digital transformation.

Keywords: *Robotics Bootcamp, STEM Education, Innovation, Coding, World Robot Olympiad, Tanzania*

1 University of Dar es Salaam (UDSM), Tanzania
2 Dar es Salaam Institute of Technology (DIT), Tanzania
3 Camden Education Trust, United Kingdom
4 United Nations Economic Commission for Africa (UNECA), Ethiopia [5] Google, United States of America

8.3 College of Social Sciences (CoSS)

8.3.1 Applying Behavioral Insights to Implement and Evaluate Enhancements to Increase Uptake and Retention of Existing Parenting Initiatives in the United Republic of Tanzania

Vendelin Simon[1]

Abstract

This study applies behavioural insights to design, implement, and evaluate enhancements aimed at increasing uptake and retention of existing parenting initiatives in the United Republic of Tanzania. Despite substantial investments by the Government of Tanzania through the Ministry of Community Development, Gender, Women and Special Groups in collaboration with the Ministry of Health, and technical support from partners such as WHO and UNICEF, programmes including Mzazi Hodari and Furaha Teens continue to face challenges related to sustained participation and retention. The study builds on national parenting frameworks and global evidence on nurturing care and behavioural change. A convergent parallel mixed-methods design will be employed, integrating quasi-experimental evaluation, qualitative inquiry, and process evaluation guided by the EPIS framework. Intervention sites in Arusha and Songwe regions will be compared with matched control sites using propensity score matching. Behavioural enhancements will include optimized scheduling, facilitator capacity strengthening, peer support mechanisms, and reminder systems designed to improve engagement and retention. Quantitative data from baseline and follow-up surveys, along with programme monitoring records, will be analysed using regression techniques to estimate programme effects on uptake and retention. Qualitative data from focus group discussions, in-depth interviews, and structured observations will explore contextual barriers, enablers, and participant experiences. A process evaluation will assess fidelity, reach, acceptability, and scalability, complemented by costing analysis to inform potential scale-up. This will be a collaborative study involving the University of Dar es Salaam as the lead research institution, the World Health Organization as the technical and implementing partner, relevant government ministries, and other partners such as ICS. Ethical clearance and oversight will be jointly ensured through established institutional and WHO ethics review mechanisms. The study will generate evidence to strengthen parenting programmes and support scalable, behaviourally informed interventions to improve child wellbeing and caregiver outcomes in Tanzania

Keywords: *Behavior, Parenting, Tanzania, Initiative*

1 College of Social Science

8.4 School of Journalism and Mass Communication (SJMC)

8.4.1 National Audience Survey on Broadcasting Viewership and Listenership

Egbert Mkoko[1], Dianus Ishengoma, Abdallah Katunzi, Sophia Ndibalema, and Zuhura Selemani

Abstract

Tanzania's broadcasting sector has experienced remarkable growth over the past three decades, expanding from a single state broadcaster in 1994 to more than 700 licensed broadcasting entities by December 2025. Despite this substantial expansion, no nationally representative audience study has been conducted by local institutions to comprehensively assess viewership and listenership patterns. Existing audience measurements have largely relied on studies conducted by external organizations, such as Geopoll, which are predominantly urban-focused and therefore offer limited insights into the diverse media experiences of audiences nationwide. To address this gap, the Tanzania Communications Regulatory Authority (TCRA) commissioned the University of Dar es Salaam School of Journalism and Mass Communication to undertake a nationwide audience survey covering all 26 regions and 139 districts of mainland Tanzania. This study aims to generate comprehensive evidence on broadcasting viewership and listenership patterns by determining the numbers of television and radio audiences for national, regional, and district-level broadcasters; determining the number of users accessing broadcasting content via online platforms; identifying content genre preferences by gender, age, education level, occupation, and geographic location; establishing the most preferred television channels and radio stations; evaluating audience perceptions of local and foreign content; identifying content gaps perceived by listeners and viewers; assessing the accessibility and user-friendliness of broadcasting services for persons with disabilities; determining preferred advertising platforms; and developing policy recommendations based on study findings. The study employed a mixed-methods design. Quantitative data were collected through a nationally representative survey of 6,698 members of the general public, and qualitative data were gathered through in-depth interviews with 120 broadcasting service providers, 30 advertisers, 26 representatives of persons with disabilities, and 5 TCRA zonal managers. In addition, focus group discussions were held with 80 primary school children to capture their experiences and perspectives on media use and preferences. Meanwhile, data collection and analysis have been

1 School of Journalism and Mass Communication

completed, and the first draft of the report has been produced; the findings are pending final approval and dissemination. This study is expected to significantly improve the quality and relevance of broadcasting services by aligning content with audience preferences and satisfaction, expanding access to inclusive media services, and supporting evidence-based broadcasting policy and regulatory decisions. Furthermore, the study provides valuable empirical data for curriculum development, teaching, research, and professional training in journalism, media, and communication studies in Tanzania.

Keywords: *Broadcasting sector, Audience research, Viewership and listenership, Media preferences, Audience perception, and Inclusive media*

8.5 University of Dar es Salaam School of Economics (UDSoL)

8.5.1 Project to provide Legal Aid for Safe Communities, Tackle Gender-Based Legal Empowerment Activities Conducted in Kinondoni, Temeke and Ubungo

Veronica Buchumi[1]

Abstract

Access to justice remains a significant challenge for vulnerable populations in Tanzania, with gender-based violence [GBV] and limited legal awareness undermining community safety. Despite existing legal frameworks, implementation gaps persist due to inadequate legal literacy, weak support systems, and underutilisation of legal technology. This project, implemented by the University of Dar es Salaam Legal Aid Clinic, sought to strengthen access to justice and promote safe communities through targeted legal empowerment interventions. The Project was conducted in Kinondoni, Temeke, and Ubungo Municipalities. The project employed community-based legal empowerment methodologies, including: (1) capacity-building trainings for Fit Persons and social welfare officers from Kinondoni and Temeke Municipal Councils; (2) skills development sessions for UDSM Legal Aid Club members to enhance practical legal aid competencies; and (3) community outreach programmes delivering free legal aid, legal education, and GBV awareness campaigns. Additionally, school bonanzas and awareness sessions were conducted in secondary schools to educate students on GBV prevention and fundamental legal rights. Key outcomes included increased legal awareness, strengthened referral

1 School of Law University of Dar es Salaam

pathways for GBV survivors, and improved utilisation of legal aid services. The project also piloted the use of legal technology tools to streamline case intake and community education, demonstrating potential for scaling access to justice. Findings indicate that community-based legal aid clinics are effective mechanisms for bridging justice gaps, particularly when combined with multi-stakeholder training and technology integration. However, sustainability requires institutional support and policy recognition of Fit Persons and paralegals. This project contributes to national efforts towards SDG 5 and SDG 16 by fostering safe communities and inclusive justice systems. Stakeholders should consider adopting this model to enhance legal empowerment in other districts.

Keywords: *Legal Aid Clinic; Access to Justice; Gender-Based Violence [GBV]; Legal Empowerment; Legal Technology; Community Outreach; Fit Persons; Tanzania.*

8.6 Mbeya College of Health and Allied Sciences (MCHAS)

8.6.1 Phase III multicentre cluster randomised trial comparing simultaneous versus sequential mass co-administration of fixed dose albendzole/Invermectin and praziquantel at community level as an integrated one health control of soil transmitted helminths, schistosomiasis and Taenia solium: Safety in humans and effectiveness in humans and pigs TRIDENT: Triple infection control through integrated drug administration

Bernard Ngowi[1], Sarah Gabriel[2], Evans Mwape[3], Charles Makasi, Christopher Mbotwa, Helena Ngowi, Elisa Sicuri[4], Jose Muñoz, Inacio Mandomando

Abstract

Introduction: Control of soil transmitted helminths (STH) and Schistosomiasis (SCH) has been part of routine programmes for many years, yet, the efficacy and effectiveness of these programmes is challenged by low and failing drug efficacy and growing concerns of anthelmintic resistance, calling for a revision of the MDA-drug strategies. In this regard, the novel fixed-dose co-formulation (FDC) including albendazole and ivermectin has proven to be safe and to overcome most of the challenges in drug efficacy for STH. For T. solium the situation is very different from STH and SCH as currently there are no countries routinely implementing control. 3SI-CONTROL will assess the safety and cost-effectiveness of the FDC co-administration with praziquantel in reducing the prevalence of T. solium, STH and SCH, in a randomised controlled trial embedded in solid implementation research.

Methods: This will be a Phase III Multicentre Cluster-Randomised Trial to assess

First Intervention

1. Simultaneous administration of single dose of FDC and single dose of praziquantel: The two drugs will be administered at the same time.

2. Sequential administration of single dose of FDC and single dose of praziquantel: First the FDC will be administered and after 14 days the

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2 Universiteit Gent, Gent, Belgium
3 University of Zambia, Lusaka, Zambia;
4 Fundacion Privada Instituto de Salud Global Bar, Barcelona, Spain

praziquantel will be administered.

Second Intervention: A second intervention will be performed in both Zambia and Tanzania using a single treatment arm, which will be the one with the best safety profile based on Year 1 outcome.

Results: Results from 3SI-CONTROL will thereby provide a scientific evidence base on the safety and effectiveness of integration of T. solium control with STH and SCH, considering the One Health approach. Beyond this, the substantial implementation research component will enable bridging the gap between the evidence-based practice (results on safety and effectiveness) and the actual implementation in the routine, real-world setting. These results, joined by a comprehensive dissemination and advocacy plan, will provide leverage to stimulate uptake of T. solium in the existing routine NTD control programmes, enabling the implementation of a safe and integrated control strategy with a higher effectiveness, tackling three top ranking NTDs. By harnessing advanced concepts in One Health, implementation research, and pharmacovigilance, our project aims to deliver transformative impacts in NTD control, reducing the individual, social and economic burdens of resource poor rural populations.

Keywords: *Community, Abendazole, Control, Soil, Taenia Solium*

8.7 Mkwawa University College of Education (MUCE)

8.7.1 Promoting Inclusive Education Through Teacher Empowerment, Assistive Device Maintenance, and Awareness in Primary and Secondary Schools in Iringa Region

Joseph Reginald Milinga[1]

Abstract

Inclusive education is a policy priority in Tanzania (Ministry of Education, Science, and Technology, 2021, 2023) as part of global commitments to quality, inclusive education for all. Yet many schools serving learners with visual and hearing impairments face challenges stemming from inadequate resources, limited technical capacity to maintain assistive devices, and persistent misconceptions about disability. Similarly, students with disabilities are often at risk of exclusion from learning in regular schools because of teachers' inadequate awareness of disability and inclusive education practices. This program aimed

1 Mkwawa University College of Education

to strengthen inclusive education by enhancing teachers' competencies in using and maintaining assistive technologies, promoting early identification of hearing impairments, and raising teachers' awareness of disability and inclusive practices. The programme involved repairing and servicing Braille machines and providing hands-on training in embosser operation, Duxbury Braille Translator integration, preventive maintenance, and hearing assessment procedures. School-based hearing assessments, aural rehabilitation, referral services, and disability awareness seminars were also conducted. More than 30 teachers received training on assistive device use and maintenance, over 100 individuals benefited from hearing-related services, and more than 30 learners with blindness gained improved access to Braille learning and examination materials. Additionally, more than 8 awareness seminars were held for more than 120 teachers, who are expected to impact more than 2,900 students enrolled across the participating schools. In the long run, the initiative is expected to improve teacher competency, enhance the sustainability of assistive devices, strengthen support for learners with disabilities, and foster more inclusive and equitable learning environments in schools. It also has the potential to reduce stigma, strengthen collaboration between the university and schools, and advance the implementation of Tanzania's National Strategy for Inclusive Education (2021-2026) to achieve Sustainable Development Goal 4.

Keywords: *Inclusivity, Education, Empowerment, Teacher*

8.8 Institute of Marine Sciences (IMS)

8.8.1 Coastal Resilience: Integrating Cost-Effective Technologies and Nature-Based Solutions for Climate Change Mitigation and Adaptation in Tanzania(ENCORE-TZ)

Mwanahija Shalli[1], Margareth S. Kyewalyanga, Francis Julius[2], Mwita M. Mangora, and Kai Kombo[3]

Abstract

Climate change is increasingly threatening Tanzania's coastal and marine environments through sea-level rise, coastal erosion, marine heatwaves, flooding, tropical cyclones, and other extreme weather events. These impacts

1 University of Dar es Salaam, Institute of Marine Sciences
2 School of Aquatic sciences and Fisheries Technology
3 Tanzania Meteorological Authority (TMA)

endanger coastal ecosystems, biodiversity, infrastructure, and the livelihoods of communities dependent on fisheries, aquaculture, tourism, and other marine-based activities. To address these challenges, the four-year project (2025–2028), Enhancing Coastal Resilience: Integrating Cost-Effective Technologies and Nature-Based Solutions for Climate Change Mitigation and Adaptation in Tanzania (ENCORE-TZ), funded by COSTECH, is being implemented in Mtwara and Mafia Island in mainland Tanzania and Unguja Island in Zanzibar. ENCORE-TZ aims to strengthen coastal socio-ecological resilience through an interdisciplinary approach that integrates climate science, oceanography, ecology, social sciences, and community participation. The project focuses on five key areas: (i) assessing climate change impacts and vulnerabilities of coastal socio-ecological systems; (ii) strengthening coastal ocean observation and prediction through cost-effective technologies and remote sensing; (iii) developing a people-centred, multi-hazard early warning system that incorporates local knowledge; (iv) enhancing ecosystem resilience through nature-based solutions, particularly mangrove restoration; and (v) strengthening capacity building, knowledge management, and multidisciplinary collaboration. ENCORE-TZ is led by the Institute of Marine Sciences, University of Dar es Salaam (UDSM), in partnership with the School of Aquatic Sciences and Fisheries (SOAF) -UDSM, State University of Zanzibar (SUZA), Tanzania Meteorological Authority (TMA) - Zanzibar, Zanzibar Fisheries Research Institute (ZAFIRI), and the Marine Parks and Reserves Unit (MPRU). These institutions contribute complementary expertise in marine science, fisheries, climate services, ecosystem restoration, information technology, research, community engagement, and policy support, thereby strengthening academia-industry-government partnerships and enhancing the translation of scientific knowledge into practical solutions for coastal resilience. Expected outcomes include improved understanding of climate change vulnerabilities, strengthened coastal monitoring and prediction systems, enhanced preparedness for climate-related hazards, restored mangrove ecosystems, stronger institutional collaboration, and increased capacity among researchers and coastal communities. The project is also supporting one PhD and two MSc students, establishing a cloud-based repository for ocean and climate data, and generating scientific publications, policy briefs, and outreach materials to inform policy and decision-making.

Keywords: *Climate change, Coastal areas, cost-effective technologies, Nature-Based Solutions*

9 CATEGORY 9: OUTSTANDING CONSULTANCY AWARD FOR SECURING HIGH-VALUE FUNDING

9.1 College of Information and Communication Technologies (CoICT)

9.1.1 Consultancy service for the review, re-design and development of electronic special load permit system

Anthony Kigombola[1]

Abstract

The Ministry of Works operates the Electronic Special Load Permit System (SLPS/e-Permit) to support the issuance of permits for vehicles transporting special or abnormal loads in accordance with the East African Community Vehicle Load Control Act, 2016 and its Regulations of 2018. The existing system, developed in 2016, has supported automation of key permit processes including application, payment, and permit issuance. However, a recent assessment identified major limitations, including non-compliance with current e-Government Authority standards and the E-Government Act, 2019 and its 2020 Regulations, as well as dependence on the outdated Microsoft .NET Framework version 4.0.30319, which has reached end of support. This project presents the review, redesign, and development of an enhanced Special Load Permit System aimed at improving regulatory compliance, operational efficiency, system security, interoperability, and user accessibility. The redesigned system is conceived as a secure, scalable, internet-based platform that supports end-to-end permit processing, including user registration, permit application, fee computation, payment processing, workflow-based approval, permit issuance, reporting, audit trails, and notifications. A key innovation of the project is the integration of SLPS with weighbridge weighing systems to strengthen real-time verification of special load permits and reduce manual validation gaps. The system is also designed to interface with relevant government and corporate systems, support mobile-responsive access, and generate standard reports in formats such as Excel and PDF. The project adopts a structured methodology comprising review of the existing system, stakeholder consultations, requirements analysis, system design, iterative development, testing, deployment, training, documentation, and post-delivery support. The implementation approach emphasizes modern open-source technologies, secure software engineering practices, database-driven workflow management, API-based integrations, and user-centred

1 Department of Computer Science and Engineering

interface design. The expected outcome is a modernized SLPS that enhances transparency, reduces processing time, improves permit verification, supports compliance with national digital government standards, and contributes to safer and more efficient management of special load transportation in Tanzania

Keywords: *Special Load Permit System, e-Permit, digital government, system redesign, weighbridge integration, transport regulation, Tanzania*

9.2 College of Social Sciences (CoSS)

9.2.1 Transformational Leadership and VAWP Training for Women Leaders at the Local Level in Pwani, Dar es Salaam, Lindi, Mtwara, Arusha, Singida and Kigoma regions

Bernadeta Killian[1] and William John Walwa

Abstract

It is acknowledged that equal participation of women in political, social and economic life is indispensable for the "Sustainable Development Goals" to be attained by 2030. In general, many governments in the world should be credited for making significant progress in promoting and documenting data about women's political representation in national parliaments. Women have continued to be underrepresented in all domains of leadership positions and decision-making organs in the world. Accordingly, UN Women (2024) revealed that "as of 1 June 2024, there are 27 countries where 28 women serve as Heads of State and/or Government. At the current rate, gender equality in the highest positions of power will not be reached for another 130 years.[2]" Gender imbalance is more prevalent in the local governments where "only three countries have reached 50 per cent, and an additional 22 countries have more than 40 per cent women in local government."[3] In addition, sexual, physical, psychological, and economic Violence Against Women in Politics (VAWP) continue to be rampant.[4] In the context of Tanzania, for example, about one-third (69%) of female candidates reported that they experienced psychological, physical, and sexual violence during the 2015 general elections. Out of these three forms of VAWP, the most

1 Department of Political Science

2 https://www.unwomen.org/en/what-we-do/leadership-and-political-participation/facts-and-figures.

3 Ibid.

4 https://www.wfd.org/sites/default/files/2022-05/violence-against-women-in-politics-global-perspectives-of-a-global-issue.pdf.

notable form of violence was psychological.[1] It is on the basis of this knowledge gap this (UDSM) consultancy project was conceived. The project is part of Women's Leadership and Economic Rights (WLER) Project seeks to "Strengthen women and girls' meaningful participation, leadership, and economic rights at the local levels in Tanzania" (WLER) (2022 – 2025). The UDSM project aims at strengthening the capacities, skills, and competencies of women with aspirations to engage in leadership positions at the local levels. Specifically, the program included, first, a transformational leadership training that targets women leaders from women's economic empowerment groups, platforms, and networks, such as Village Community Banks (VICOBA), Agricultural Marketing Cooperative Societies (AMCOS), beneficiaries of the local government loans, women leaders from grassroots women's rights platforms and networks with aspirations to engage in leadership positions and public office as well as chairpersons of *vitongoji* (sub-villages), villages, *mitaa* and members of different committees at the *vitongoji*, villages, *mtaa*, and ward level. Secondly, through the project, a training on Violence Against Women (VAWP) was conducted – targeting officers from the police, judiciary, PCCB, Office of the Registrar of Political Parties (ORPP) in Tanzania and Zanzibar and media personnel. Thirdly, UDSM conducted media analysis pertaining to VAWP and participation of women in the local government elections – expected to take place in November 2024. The media analysis informed post-election assessment. Furthermore, a mentorship program was developed to build political constituency of female leaders vied for leadership positions in the 2024 local government elections. Fourthly, UDSM undertook a comprehensive study to; First, assess the extent of women's participation in leadership and decision-making, based on a case of the last 2024 grassroots elections in the WLER Project regions, namely Singida, Arusha, Dar es Salaam, Pwani, Mtwara and Lindi. Secondly, to determine the community perception of the change of attitudes, beliefs and socio-cultural norms about women's participation in decision-making and GEWE. The assessment and community survey were undertaken concurrently. Finally, UDSM and UN Women collaborated to; first, contextualize and translate the global local and national legislative induction training manuals for local councilors and parliamentarians respectively; secondly, to run a trainers of trainers (ToT) so as to develop a cohort of competent local experts, and finally to conduct two pilot trainings covering newly elected female local councilors, *mtaa* and village chairpersons and a select representation of local government authorities leaders, one training in Lindi Region and another in Mtwara Region.

Keywords: *Women, Politics, Participation, SDGs*

1 https://mlkrook.org/pdf/TWCP_VAWE.pdf.

9.3 University of Dar es Salaam Computing Center (UCC)

9.3.1 ARIS: AI-Powered Smart University Platform for Academic and Administrative Transformation

Obedy Kamanjenzi[1], Alinani William, Prudence Ongera and Frank Msuya

Abstract

The rapid growth of higher learning institutions and increasing demand for efficient academic service delivery have exposed significant challenges associated with manual processes, fragmented systems, delayed approvals, limited accessibility, poor data integration, and inadequate decision-support mechanisms. Bridging this gap, the Academic Registry Information System with AI (ARIS) was introduced as an advanced AI-powered web-based Smart University Platform designed to digitize, automate, and optimize academic and administrative operations in higher learning institutions ARIS integrates modern technologies, intelligent automation, and robust security mechanisms to create a centralized digital ecosystem that enhances operational efficiency, improves service delivery, and supports data-driven decision-making. The platform is designed to streamline institutional processes while improving accessibility, transparency, accountability, and security across university operations. The system incorporates several intelligent modules and functionalities, including a Smart AI Assistant featuring voice support, chatbot interaction, and guided walkthroughs to assist users in accessing institutional services efficiently. The platform also provides comprehensive Academic and Registration Management capabilities, enabling seamless handling of student admissions, registration, examinations, grading, transcripts, and academic records. To improve institutional productivity and governance, ARIS supports automated workflows and approvals, reducing delays and minimizing dependence on manual paperwork. The system further integrates secure digital identity management with QR-based authorization, ensuring secure authentication and controlled access to institutional services and resources. Additionally, role-based access control and security scanning mechanisms enhance data protection, system integrity, and cybersecurity management. The platform includes real-time dashboards and analytics that enable administrators and institutional leaders to monitor operational performance, evaluate trends, and make informed strategic decisions through AI-driven insights. ARIS also supports communication and notification services that facilitate timely information sharing between students, lecturers, administrators, and stakeholders.Beyond academic administration,

1 Software Engineering Department, University of Dar Es Salaam Computing Centre

the system provides modules for sponsorship and finance management, student and staff management, accommodation and allocation management, as well as graduation and attendance management. To improve interoperability and user convenience, the platform incorporates Single Sign-On (SSO) integration, enabling seamless and secure access to multiple institutional services using a unified authentication mechanism. ARIS is highly relevant to public and private universities, higher learning institutions, government education bodies, training institutions, and research organizations seeking to accelerate digital transformation and institutional modernization. Since its development, the innovation has generated significant positive impact by enhancing efficiency, transparency, and accountability in academic and administrative operations. The platform has improved service delivery and user experience for students, lecturers, administrators, and institutional stakeholders through intelligent automation and accessible digital services. Furthermore, ARIS strengthens system security and data protection through secure digital authorization mechanisms while enabling faster and smarter decision-making using AI-powered analytics and reporting tools. The system also contributes to sustainable and environmentally friendly operations by minimizing paperwork and promoting paperless workflows. Through accessibility enhancements, chatbot support, voice-enabled assistance, and modern integration capabilities, ARIS supports inclusive access and future-ready institutional operations compatible with emerging technologies and smart education ecosystems. By leveraging Artificial Intelligence, intelligent automation, secure digital infrastructure, and integrated academic management technologies, ARIS provides an innovative, scalable, and sustainable solution capable of transforming higher education administration and advancing smart university ecosystems in the digital era.

Keywords: *Digital Transformation, QR Code Authorization, Real-Time Analytics, Single Sign On (SSO), Voice-Enabled Assistance, Academic Digitalization, Paperless Administration, Data-Driven Decision Making, Smart Campus Solutions, Automated Workflows, AI-Powered Education Systems*

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