International Conference on Technology and Management

25th - 26th September 2025

ICTM-25

CONFERENCE PROCEEDINGS

Uganda
Technology
And
Management
University

UTAMU
Kungu Campus, Uganda

These proceedings have been published by the

Graduate School,

Uganda Technology And Management University, (UTAMU)

Kungu Campus

+256 770 884643, +256 750 599736

info@utamu.ac.ug

Plot 8374 Block 82 Kyadondo, Kungu, Gombe, Nansana, Wakiso;
P. O Box 73307, Kampala, Uganda

Bugolobi Campus

+256 702 646093, +256 780 249942

info@utamu.ac.ug

Plot 2 Erisa Rd, Kiswa Bugolobi, Kampala;
P.O Box 73307, Kampala, Uganda

EDITORIAL TEAM

OPENING REMARKS OF THE VICE CHANCELLOR OF THE UGANDA TECHNOLOGY AND MANAGEMENT UNIVERSITY

AT THE 9TH INTERNATIONAL CONFERENCE ON TECHNOLOGY AND MANAGEMENT (ICTM-25)

Professor Paul Mark Jjunju, Vice Chancellor. UTAMU

25th September 2025

All protocols observed.

I am highly honoured and privileged to give the opening remarks at this 9TH International Conference on Technology and Management (ICTM) at the University of Technology And Management (UTAMU), Kungu Campus. This year's Conference is so special, arising from the circumstances surrounding the times and preparation for the Conference. To this end, the Conference is ongoing on both physical and virtual modes. Secondly, the preparation for this conference was extra-ordinary, due to the ongoing lectures by the Academic Staff, which affected the preparation for the Conference. Without doubt, the number of physical participants at this conference would have been more but for the lecturing. It is elating, however, that several participants are joining online.

I am pleased, as a Computer Scientist, to inform you that this year's Conference, like previous editions, has been structured to explore germane and current topics on digital disruption, sustainability, and applications among others, driven by Artificial Intelligence. This Conference, based on AI themes, could not have been timelier. Organizational performances are now not only being measured by financial positions but also by the footprints they leave while conducting their business activities. Organizations are no longer expected to prosper at the expense of the environment. I am glad to know that the papers submitted for presentation at this Conference have thoroughly examined the theme and the various sub-themes. In its 9th edition, the Conference continues to provide a unique platform for academics to cross-fertilize ideas and receive constructive critiques and feedbacks on the papers presented under diverse sub-themes.

Special thanks to the organizer Professor Muwanga-Zake and to our ICT Department that provided the convivial environment for this year's Conference. May I seize this opportunity to recognize the commitment of UTAMU to the conference for its untiring effort which has, to a large extent, given us the mileage for this event. It is also necessary, at this point to acknowledge the participants, representatives among our guests and special guests of this occasion.

Thank you all very much.

CONTENTS

CONFERENCE SUMMARY

Conference Name	International Conference of Technology and Management
Acronym	ICTM-25
Date	25th – 26th September 2025
Organisers' Team	
	Professor Muwanga-Zake, Johnnie Wycliffe Frank, Chairperson, International Conference of Technology and Management
	Professor Johnson Wagona Makoba, Technical Advisor, International Conference of Technology and Management
	Professor Jjunju, Fred Paul Mark, VC, Uganda Technology And Management University
	Dr. Ssemujju, Stuart, Head, ICT, Uganda Technology And Management University
	Mr. Pao, Geoffrey, Website Administrator, Uganda Technology And Management University
	Mr. Luzze, Calvin, Personal Assistant to the VC, Uganda Technology And Management University
	Mr. Mwesigwa, Allan, ICT Department
	Mr. Mwebaze, Shieldson, ICT Department
Venue	Uganda Technology And Management University, Kungu Campus, and Online
Keynote Speakers	
	Professor Olubayi Olubayi, Chief Academic Officer at Maarifa Education, Kenya; Chairman University Council; Cavendish University Uganda

CONFERENCE OVERVIEW

A 9th International Conference on Technology and Management (ICTM-25) commenced on the 25th and ended on the 26th September, 2025, at the Uganda Technology And Management University (UTAMU), Kungu Campus. It was additionally streamed online.

The aim of this conference was to enable an exchange of ideas between stakeholders, including academia and AI practitioners with a view of paving ways towards more efficient and innovative applications of AI.

Thus, ICTM-25 provided a distinctive environment where authors, practitioners, researchers, professionals and academicians and their students engaged in discussions about the future developments in terms of technology innovations and business, management and governance to contribute to the UN SDGs and global challenges.

Areas of Research

The papers should be original research and case studies in the fields of computing, technology and management, and on issues surrounding integration of Computing, Technology and Management in a multi-disciplinary context. Therefore, the conference series is of interest to academicians, researchers, policy makers, environmentalists, managers, planners, industrialists, consultants, government and NGOs globally, across a range of disciplines.

ICTM-25's theme was**: "Embracing Artificial Intelligence in Education, Governance, Management and Leadership: Successes and Challenges."** The aim was to gather practices that have used Artificial Intelligence tools efficiently in work environments. Papers were submitted at https://conference.utamu.ac.ug/submit-an-article/ . Other papers were submitted to the ICTM email: ictm@utamu.ac.ug. The following were the scheduled important dates:

Deadlines	Date
Paper abstract submission deadline:	17th August 2025
Acceptance notification:	21st August 2025
Early Registration deadline:	30th August 2025
Late Registration	After 14th September 2025
Presentation submission deadline:	14th September 2025
Conference days:	25th to 27th September 2025
Paper submission for publication deadline:	30th October 2025 (Assumption is that author might have made corrections during presentation)

The following were the tracks:

A: Real-world AI Applications

Impact on teaching and learning in academic institutions	Pathways to adoption and utilisation of AI in governance, management, health and education
Rethinking professional roles and competencies in the AI era	Preparing Developing Countries for the AI Revolution
Work in the age of AI	Readiness for the 4th and 5th Industrial Revolutions
Forensics, and Cyber Security pros and cons of AI	

B: AI in Computing and Communications

Developing models across diverse datasets and environments in AI research	Machine Learning
Versatile AI systems	Meta—Learning for efficiency in AI.
Image recognition, natural language	AI models against adversarial attacks
Open Spectrum Solutions	AI Communication Protocols

C: AI in Business, Governance, Management and Leadership

AI-assisted Education planning and management	Business Policy and Strategy involving AI
AI Influenced Educational Leadership	AI Generated Entrepreneurship and Ventures
Public administration and management	AI Forensics in Accounting
Influence of AI in Public Policy	AI-led Marketing
Role of AI in Monitoring and Evaluation	Project Planning and Management
Development economics	Use of AI in Service Management (including healthcare and hospitality management)
AI Use in E-commerce	Organisational Behaviour and AI

Accepted Peer Reviewed Conference papers would be published in a **special issue** of International Journal of Technology and Management (IJOTM: ISSN 2518-8623. 15 abstracts are presented as follows:

- 10 papers in Category C
- 3 papers in Category A
- 2 papers in Category B

Please note that many of these are not easy to classify. Clearly though, the majority focused on AI applications.

ICTM-25 CHAIRPERSON'S MESSAGE

Since its maiden edition in 2015, ICTM has sustained this laudable initiative to support discourses in academics, to improve research, writing and presentation skills and competencies. This ICTM platform has obliged a crucible generation and refinement of research ideas. Indeed, ICTM promotes healthy critiques of presentations that are challenging and intensive thus building a new crop of ideas and innovations. This mentors and encourages researchers beyond any possible financial or career rewards towards the rigour unwaveringly leading to improved theses of better ideas.

ICTM provides a platform for different stakeholders to discuss and debate on technology and management. There is a pressing need for stakeholder spaces to debate contemporary issues and developments. The annual international conference has, over the years, become a destination conference where quality papers, both theoretical and applied, are discussed with participation from students, researchers, civil society and policy practitioners.

Apart from papers invited and put through a rigorous process, we also have special tracks for every practitioner. This year, ICTM-25 broadened its scope to grapple with a wide range of issues and advancements in Artificial Intelligence. With papers presented across domains like gender, democracy, finance, education, health challenges and solutions, this conference was seen as a step in the right direction towards expanding the scope of AI applications.

The Ninth Conference, in particular, was an eye-opener. Conducted online and face-to-face at campus, it required a schedule that recognized different time zones, so it could be attended internationally. We did not compromise on rigour in any way. We made the best use of the challenges to innovate a streaming that did not require registration fees. However, it did not fully provide for the personal interaction and exchange of views that happen on the sidelines. Nonetheless, this new format allowed facilitation of participation of speakers, irrespective of where they were located, to address the participants.

I am particularly firstly thankful to the UTAMU Vice Chancellor, Professor Paul Mark Jjunju who enabled and inaugurated the conference. His decisions about ICTM-25 were firm and unwavering. I would additionally like to place on record the acknowledgement for the excellent work done by the ICT Department at UTAMU, led by Dr. Stuart Ssemujju who solved technical challenges to efficiently stream the conference in time. Mr. Calvin Luzze was impeccably professional with his provision of secretarial services. Special thanks go to the Master of Ceremony, Dr. Joseph Michael Okwadi Tukei who with enthusiasm and a cheerful character made the conference so lively.

Thanks to Professor Olubayi Olubayi for yet another awesome keynote speech, as usual challenging the status quo of academia. Behind all of this ICTM-25, was Professor

Makoba Wagona Johnson for his unwavering advices always focussed to see ICTM-25 successful.

I extend gratitude to the distinguished plenary speakers and the Session Chairs. Thank you to all participants who found time in the middle of their normal duties to actively contribute to all deliberations. I have already written letters of appreciation to all participants.

I am sure, going forward, ICTM-25 will possibly be a template, as it did not involve costs beyond the UTAMU internet and personnel.

Professor Muwanga-Zake, Johnnie Wycliffe Frank
Chairperson,
9th International Conference of Technology and Management
2025

CONFERENCE HIGHLIGHTS

A. Keynote Speech

KEYNOTE SPEECH – PROFESSOR OLUBAYI OLUBAYI	
Title of Speech	How to develop a pipeline of worldclass AI producers for Africa: Merit-based STEM Schools
Moderator	Prof. Muwanga-Zake, JWF
Abstract	This presentation gives the key action points required for African countries to produce worldclass AI innovators.
Major Takeaways	African countries do not need to reinvent the wheel; Developed countries and rapidly developing countries have school systems and curricula and pedagogies that are designed to transform their best students into producers in all fields of endeavour including computer science and AI; The foundation for success in computer science and AI and other essential technical fields is excellence in mathematics, critical thinking, curiosity and commitment to lifelong learning; 80% of African children are attending school, but they are not learning Establish a small number of selective merit-based STEM schools for the education of the most gifted and most talented and most determined students from all regions and all socio-economic strata of the country (Olubayi, 2024; Olubayi, 2025)

B. The Plenary Sessions

DAY 1 – SESSION 1		
Research at UTAMU – Short Abstracts from UTAMU students		
1. Human Resource Capacities and the Performance of the Drug Supply Chain in Kampala City Council Authority (KCCA) Health Facilities:	Buke Richard Raymond Wagoli (M.SC. M&E)	Dr. Wanjiku, Catherine
2. Influence of Work Environment on Health Workers Performances. Case of Yei River County Health Facilities – South Sudan	Simaya Ladu James & Dr. JMO Tukei	Dr. Wanjiku, Catherine
3. Pathways to Adoption and Utilisation of AI in Governance, Management, Health, and Education	Omony Okoed (M.Cs. Student)	Dr. Ayoo, Phillip
4. Privacy-Preserving Anti-Money Laundering Compliance System for Financial Institutions	Bwambale Edwin	Dr. Ayoo, Phillip
5. Skulpal: A Conversation Ai System for Uganda's Competence-Based Curriculum	Nkajja, Stephen,	Dr. Ayoo, Phillip

DAY 1 – SESSION 2		
Research at UTAMU – Short Abstracts from UTAMU students		
1. Human Resource Capacities and the Performance of the Drug Supply Chain in Kampala City Council Authority (KCCA) Health Facilities	Buke Richard Raymond Wagoli	
2. Students in Higher Education and AI Use	Abdul Mayanja, Guild President, Discussion by a Panel of Students.	
3. Keynote Speech: How to develop world class AI Producers for Africa: Merit-based Schools	Professor Olubayi Olubayi, Chief Academic Officer at Maarifa Education, Kenya;	Prof. Muwanga-Zake

	Chairman University Council; Cavendish University Uganda	
4. Implications of Learning and Teaching Under the Realities of Artificial Intelligence (AI)	Prof. Muwanga-Zake, JWF	Dr. Stuart Ssemujju
5. The Role of Artificial Intelligence (AI) in Higher Education	Semalulu, Paul (PhD) – Senior Lecturer, Kabale University **&** Atwiine, Simon Alex, ICT Assistant, Kabale University	Ms. Mirembe Florence
6. Designing and Implementing a Master's Programme in Artificial Intelligence and Data Science: An Interdisciplinary Approach at Uganda Technology and Management University (UTAMU)	Dr. Ayoo, UTAMU	Mr. Kabiito, Simon Peter
7. Change Management and Service Delivery Challenges in Uganda's Urban Informal	Emmanuel Lwanga Kayongo, Texila American University & Dr Benson B. Okech, UNICAF University	Dr. Wanjiku, Catherine

DAY 2 – SESSION 1		
8. Detection of Phthalates in Essential Oil Using Paper Spray Mass Spectrometry with Artificial Neural Network	Jjunju Fred Paul Mark1, Isa Kabenge4, Ryan. D5, Allan Marshal2, Friston Sebastian3, David Swapp3, Anthony Steed3	Prof. Muwanga-Zake, JWF

9. Responsible Collective Intelligence: Integrating Human, Artificial, and Contextual Intelligence for Ethical Leadership in the Age of AI.	Professor Abdulhakeem Ajonbadi, University of Qatar,	Dr. Ssemujju, Stuart
10. Data Driven strategy: How AI is shaping Organizational Decision-making	Dr. Ssemujju Stuart, UTAMU	Mr. Kabiito Simon Peter
11. Open-Source AI Chip Development Ecosystems and Design Tool Effectiveness Through Meta-Analysis of Academic and Industry Projects	Pamba Shatson Fasco, Kampala International University	Dr. Okoche, Michael
12. AI Algorithms and Academic Integrity	Prof. Muwanga-Zake, JWF	Prof. Jjunju,

DAY 2 – SESSION 2		
13. Measuring Performance in Generative AI: Metrics, Methodologies, and Industry Implications	Prof. Wakou, N. (M.S. Electrical Engineering, M.S. Microelectronics Technology) - Dell Technologies, Austin, Texas	Dr. Ayoo, Phillip
14. Embracing Artificial Intelligence for Forecast-Based Energy Optimization: Advancing Sustainable Power Systems Towards SDG Achievement	Ssemakula, John Bosco (PhD), Kimwise Alone (PhD) and Balirwa Moses (M.Cs.) – Senior Lecturers, Cavendish University	Prof. Muwanga-Zake, JWF
15. Leveraging AI and UAV Technologies to Enhance Sustainable Livestock Production	Prof. Jjunju Fredrick Paul Mark, Nakatumba J. Nabende, Sanya Rahman, and Isa Kabenge	Mr. Kivumbi, Timothy

16. Note Speech: The Future is NOT Born of Complacency: AI in Management and Governance in the 21st Century Africa.	Prof. Makoba, Wagona Johnson, Professor Emeritus, University of Nevada, RENO, USA	Ms. Dr. Ayoo, Phillip
17. Research on Adopting a Socio-Judicial Approach to Implementing AI in the Court	Dr. Ari Niki-Tobi - Former Magistrate Judge in Lagos State judiciary, Nigeria; an adjunct of Criminology and Sociology of Law at the State University of New York, Oneonta	Dr. Ssemujju, Stuart

CONCLUSION:

THE NEXT STEPS FOR THE GE PROGRAM AND THE GE STAKEHOLDERS

A. Participants' Main Recommendations From ICTM-25

AI is pervasive and has penetrated all professions and lives. People use AI unawares, for good or for criminal activities. So, there is a need for a policy to ensure that uses are ethical and legal. The policy should include definitions of AI, aware that AI keeps evolving.

Therefore, it was decided that:

1. An association of practitioners be created, which should *inter alia* attend to AI ethics and legal frameworks;
2. Advise on the research agenda and future developments in AI;
3. Solicit for funding to enable research AI research in areas recognized as beneficial to human kind as well as social-economic and environmental sustainability, and;
4. Fo any other additional matters of concern.

The Association was tentatively named **Uganda Association of Artificial Intelligence Practitioners**. The UTAMU Secretary will be requested to draft a constitution for UAAIP.

Furtrhermore, institutions of learning should support learners and facilitators on how best to use AI.

B. Participants' Main Recommendations for ICTM

1. The themes for ICTM-26 should be announced as soon as possible but should possibly further discussions on AI.
2. There should be proper documentation of the proceedings of ICTM-25
3. It could be necessary to link ICTM with other related conferences.

ABSTRACTS

DAY 1 ABSTRACTS

1. Wagoli, B. R. R., Uganda Technology And Management University

Title: Human Resource Capacities and the Performance of the Drug Supply Chain in Kampala City Council Authority (KCCA) Health Facilities

Keywords:

Drug Supply Chain, Human Resource Capacity, Public Health, Facilities, Kampala City Council Authority (KCCA), Mixed Methods, Health Systems Strengthening.

Several staff traits were assessed using surveys and confirmed through interviews as part of the study s investigation into the impact of human resource capacities on the drug supply chain: performance in KCCA health facilities. The respondent pool was predominantly female (60%), aged 30–39 years (46%), and largely held diploma-level qualifications (66%). Using a convergent mixed-methods design, data were collected from 70 survey respondents (70% response rate) and 6 key informant interviews (100% response rate), yielding an overall response rate of 71.6%. Quantitative data were analysed using descriptive statistics, correlation, and regression analyses, while qualitative data were presented through thematic narratives and illustrative quotes.

2. Simaya, L. J. & Tukei, J. M. O., Uganda Technology And Management University

Title: Influence of Work Environment on Health Workers Performances. Case Of Yei River County Health Facilities – South Sudan

Key wards

Health care, Work Environment, performance, Yei River County.

This study explores the relationship between the working environment and the performance of healthcare workers in Yei River County, South Sudan. Using a descriptive research design with a quantitative approach, data were collected through self-administered questionnaires distributed to a sample of 133 healthcare workers. The questionnaire employed a five-point Likert scale to assess perceptions of various environmental factors, such as safety, resources, organizational culture, and policy awareness. Data analysis involved the use of descriptive statistics (means and standard deviations) and inferential statistics, including Pearson product-moment correlation and ANOVA tests, to examine the strength and significance of relationships between the work environment and health worker performance.

Results indicated a moderate positive correlation ($r=0.32$, $p=0.006$) between work environment and performance levels of health workers in Yei River County. However, challenges such as inadequate safety standards, limited policy awareness, and burnout were identified as barriers to optimal performance of health workers. Based on these findings, the study recommends that the Ministry of Health and local authorities in Yei River County should undertake infrastructural improvements, regular safety

assessments, staff training on policies, and workload management strategies to foster a safer, more motivating work environment that enhances healthcare quality in Yei River County.

3. Omony, O. F., Uganda Technology And Management University

Title: Pathways to Adoption and Utilisation of AI in Governance, Management, Health, and Education

Keywords: AI and governance

Artificial Intelligence (AI) presents transformative opportunities for governance, management, health, and education in Uganda. While countries such as Rwanda, Kenya, and South Africa are adopting AI to improve service delivery, Uganda has lagged despite policy frameworks such as Vision 2040 and the National ICT Policy.

Key challenges include inefficiencies in electoral systems, mismanagement of SACCOs under the Parish Development Model (PDM), delayed disbursements, health supply chain breakdowns, and weak accountability in education and institutional management.

Using evidence from the 2015/2016 Electoral Commission Report and the Auditor General's findings (pp. 28–32, 78–83), this paper highlights Uganda's urgent need for AI-powered solutions such as.

- AI-enhanced eVoting to ensure transparency, reduce fraud, and restore trust.
- AI-powered SACCO and PDM management systems to improve fund utilization, accountability, and monitoring.
- AI in health for predictive drug stock management and diagnostics.
- AI in education for personalized learning and administrative efficiency.

Recommendations. Establish a national AI strategy, fund pilot AI projects (eVoting, SACCOs), amend regulatory frameworks, build digital infrastructure, and integrate AI into higher education curricula.

4. Bwambale, E. Uganda Technology And Management University

Title: Privacy-Preserving Anti-Money Laundering Compliance System for Financial Institutions

This work proposes the development of an open-source prototype that integrates Secure Multi-Party Computation (SMPC), Homomorphic Encryption (HE), and Zero-Knowledge Proofs (zk-SNARKs). The system is designed to enable financial institutions to perform secure transaction monitoring and sanction screening without exposing sensitive customer data. It is specifically architected to be cost-efficient and deployable on commodity hardware, addressing critical challenges in balancing FATF compliance with GDPR privacy requirements.

5. Nkajja, S., Uganda Technology And Management University

Title: Skulpal: A Conversation Ai System for Uganda's Competence Based Curriculum

Keywords:

AI in Education, Uganda New Curriculum, Personalized Learning, Educational Technology, Skulpal

Uganda's new secondary school curriculum emphasizes competency-based learning, practical skills, and learner-centred approaches. Despite these advances, teachers and students continue to face challenges in accessing relevant, structured, and adaptive learning resources that align with the curriculum. This paper presents Skulpal, an AI-powered educational application designed to support the implementation of Uganda's new curriculum. The system leverages artificial intelligence to provide personalized learning experiences, generate curriculum-aligned questions and answers, and offer concept explanations through a conversational AI interface, providing valuable support for both teachers and learners. Methodologically, the project applies machine learning models fine-tuned with curriculum-aligned data from the National Curriculum Development Centre (NCDC) and insights from available curriculum experts for natural language processing. The system also incorporates a Django-based backend and a React JS/React Native mobile interface to ensure usability and accessibility for both students and teachers. Preliminary results indicate that Skulpal can reduce content gaps, enhance engagement, and improve comprehension by tailoring learning experiences to individual student needs. By integrating AI-driven content generation with curriculum-specific resources, the application addresses critical challenges in educational resource accessibility, assessment preparation, and concept clarification. This research contributes to educational technology by offering a scalable and practical solution for enhancing curriculum delivery and supporting competency-based learning in Uganda's secondary education system, demonstrating the potential of AI to bridge gaps between curriculum standards and interactive, learner-centred educational tools.

6. Muwanga-Zake, JWF. Uganda Technology And Management University

Title: Implications of Learning and Teaching Under the Realities of Artificial Intelligence (AI)

Keywords: AI-assisted learning; AI-assisted assessment; AI use policies in educational institutions

The question of whether learners and facilitators of learning use AI is obsolete. Thus, education institutions must find ways of facilitating AI-assisted learning.

AI such as Scholar GPT is inadvertently employed to search and construct essays that have currency in understanding contemporary strides in knowledge. Some AI-enabled systems and tools seek to address this potential conflict. For example, one AI-enabled reading tutor listens to students as they read aloud and provides on-the-spot feedback

to improve their reading. Researchers have embedded games to improve understanding of Newtonian physics.

The focus on learning growth and gains is optimal (absent negative consequences or a high-stakes environment). For example, AI enables real-time feedback thus providing invaluable formative and continuous assessment for learners.

The utilization of AI is however provocative and conflict against practices the authorities recommend albeit with conservative restraint. This too often leaves learners and learning facilitators with unpleasant but introverted feelings towards AI.

This paper discusses possibilities of finding a balance between AI and human assisted learning, and policy implications.

7. Semalulu, Paul (PhD) – Senior Lecturer, Kabale University, & Atwiine, S. A., ICT Assistant, Kabale University

Title: The Role of Artificial Intelligence (AI) in Higher Education

Keywords: artificial intelligence, higher education, machine learning, digital age, philosophical analysis.

The rise of Artificial Intelligence (AI) and machine learning has significant implications for various fields, including computer science, and philosophical sciences. A philosophical reflection is needed to provide direction for the use of AI in Post Graduate Education. This study examines the implications of AI higher education in the digital age, analyses the impact of AI on education, research, and society at large, and speculates on future developments and potential shifts in philosophical discourse. The study's core findings suggest that the use of AI systems that can generate knowledge and challenge traditional methods of knowledge acquisition and validation has significant implications for philosophical discourse. The method used in this research is the mixed methods approach.

The impact of AI on education, decision-making, and society at large is significant, but ethical concerns must be addressed. The future of epistemology in the AI era is uncertain, but interdisciplinary education and the integration of ethics in AI education are necessary to prepare for the future. Further research is needed to explore the potential of AI in various fields and address ethical concerns. This paper contributes philosophical thinking to knowledge discovery and the knowledge verification process in the context of AI development in higher education.

8. Dr. Ayoo, UTAMU, Uganda Technology And Management University

Title: Designing and Implementing a Master's Programme in Artificial Intelligence and Data Science: An Interdisciplinary Approach at Uganda Technology and Management University (UTAMU)

Keywords

Artificial Intelligence, Data Science, Interdisciplinary Education, Higher Education, Curriculum Development, Digital Transformation, Uganda Technology and Management University.

Artificial Intelligence (AI) and Data Science (DS) are increasingly recognized as transformative forces reshaping education, governance, management, and leadership across the globe. Responding to this demand, Uganda Technology and Management University (UTAMU) has developed a new Master's programme in Artificial Intelligence and Data Science (M.AI&DS) aimed at producing graduates with advanced technical competencies and the ability to apply AI-driven solutions across multiple sectors. This paper presents the design, structure, and interdisciplinary orientation of the programme, highlighting how it demonstrates the impact of AI in diverse fields such as physics, chemistry, biology, agriculture, healthcare, education, engineering, business, and law. The paper outlines the programme's objectives, admission requirements, knowledge areas, and research component, emphasizing its blended and project-based learning approaches. Furthermore, it discusses the challenges of curriculum development, including faculty expertise, infrastructure, and ethical considerations. By sharing lessons from UTAMU's experience, the paper contributes to the broader discourse on integrating AI into postgraduate education in Africa and demonstrates how higher education institutions can prepare professionals to lead digital transformation in their respective domains.

9. Lwanga-Kayongo, E., Texila American University & Okech, B. B. Okech, UNICAF University

Change Management and Service Delivery Challenges in Uganda's Urban Informal

Keywords: Governance; Informal Resilience; Institutional Barriers; Political Interference; Regulation

The Boda-Boda sector in Kampala, Uganda, is an important source of urban mobility and youth employment, but its unregulated and fragmented nature creates ongoing challenges to reform and service delivery. Despite repeated efforts by municipal and national authorities, progress has been hindered by structural, political, and socio-economic barriers.

This study examines the obstacles to change management in service delivery within the industry, focusing on institutional weaknesses, legal ambiguity, political interference, and economic vulnerability. A mixed methods approach combined survey data from 345 riders with key informant interviews. Descriptive statistics identified perceived barriers, while correlation and regression analyses examined their relationship to service delivery. Thematic analysis of qualitative data further shed light on institutional dynamics and rider experiences.

Findings highlight widespread recognition of barriers, particularly poor coordination among regulators (mean = 4.19), political interference (mean = 4.03), and weak enforcement (mean = 3.97). However, quantitative results showed a weak, statistically insignificant link between these challenges and service delivery outcomes ($r = 0.058$, $p = 0.281$). Qualitative evidence suggests that resilience strategies, patronage networks, and mistrust in institutions offset the impact of reforms, enabling the sector to function despite systemic weaknesses.

The paradox of widely recognised institutional barriers but limited-service delivery effects emphasise the adaptability of informal systems and the constraints of top-down reforms. The study recommends participatory and context-aware approaches, stronger regulatory accountability, incentives for formalisation, and real-time monitoring to develop a more resilient urban transport system.

**10. Jjunju, F. P. M., Uganda Technology And Management University,
Kabenge, I. Department of Biosystems Engineering, Makerere University, Kampala Uganda, Sebastian, F., Swapp, D., & Steed, A., AI Lab School of Computer Science, Makerere University, Kampala Uganda**

Title: Leveraging AI and UAV Technologies to Enhance Sustainable Livestock Production

Key words:

Detecting, and tracking the animals, feeding optimization, behavioural analysis, disease detection n and health monitoring

With advancements in unmanned aerial vehicle (UAV) technology and Artificial Intelligence (AI), there is an opportunity to revolutionize monitoring, detecting, and tracking the animals, feeding optimization, behavioural analysis, disease detection n and health monitoring among others. Additionally, integrating these technologies can significantly enhance sustainable livestock management practices by optimizing pasture usage, improving water source monitoring, and enabling precise estimation of greenhouse gas emissions, thus contributing to environmental conservation and resource efficiency. This presentation illustrates the utilization of Artificial Intelligence (AI) for near real-time cattle detection, counting and tracking using Unmanned Aerial Vehicles (UAVs). Future applications of these technologies in livestock management, such as livestock health monitoring, behavioural analysis, estimation of greenhouse gas emissions and pasture management, are also discussed.

11. Ssemujju, S., Uganda Technology And Management University

Title: Data Driven strategy: How AI is shaping Organizational Decision-making

The rapid emergence of Artificial Intelligence (AI) has transformed how modern organizations create value, gain competitive advantage, and make strategic decisions. This review paper examines the evolving role of AI as a core enabler of data-driven strategy, highlighting its impact on organizational decision-making processes across industries. Drawing on recent scholarly literature and empirical studies, the paper explores how AI-powered analytics, machine learning models, and intelligent automation enhance decision accuracy, speed, and predictive capability.

It further discusses the shift from intuition-based to evidence-based management, emphasizing the integration of real-time data, advanced algorithms, and decision-support systems. The review also identifies key challenges including data quality concerns, algorithmic bias, ethical risks, and organizational readiness that influence the effectiveness of AI-

enabled decision frameworks. By synthesizing current trends and practical insights, this paper provides a holistic understanding of how AI is reshaping strategic thinking and offers recommendations for organizations seeking to leverage AI responsibly to achieve operational efficiency, innovation, and sustainable competitive advantage.

12. Pamba, S. F., Kampala International University

Title: Open-Source AI Chip Development Ecosystems and Design Tool Effectiveness Through Meta-Analysis of Academic and Industry Projects

Keywords:

Open-source hardware, AI accelerators, design tools, meta-analysis, neural processing units

The rapid evolution of artificial intelligence has driven demand for specialized computing architectures, with open-source AI chip development emerging as a critical alternative to proprietary solutions. This research presents a meta-analysis of open-source AI chip development ecosystems through systematic analysis of 127 academic publications and 43 industry projects spanning 2015-2024.

The study employs mixed-methods combining quantitative meta-analysis with qualitative thematic analysis to assess project characteristics, collaboration patterns, and tool performance. Analysis reveals significant disparities between academic and industry approaches, with academic projects demonstrating higher innovation rates ($\mu = 2.3$ novel architectures per project) but lower commercial viability scores ($\mu = 3.2/10$) compared to industry initiatives ($\mu = 1.4$ and 6.8 respectively, $p < 0.001$). Design tool effectiveness analysis identifies critical gaps, with open-source EDA tools achieving 67% feature parity compared to commercial alternatives.

The research contributes a framework for evaluating open-source hardware ecosystems, quantifies the maturity gap between academic research and industrial deployment, and provides evidence-based recommendations for improving design tool effectiveness.

13. Wakou, N. (M.S. Electrical Engineering, M.S. Microelectronics Technology) - Dell Technologies, Austin, Texas

Title: Measuring Performance in Generative AI: Metrics, Methodologies, and Industry Implications

Keywords:

Generative AI, Benchmarking, Large Language Models, Performance Evaluation, AI Ethics, LoRA, Energy Efficiency, MLPerf.

Generative AI (GenAI) technologies, including large language models (LLMs), diffusion models, and multimodal architecture are rapidly transforming sectors ranging from education and healthcare to enterprise automation and creative industries. As these models scale in size and complexity, their computational demands grow exponentially, making performance evaluation a critical aspect of system design and deployment. This paper examines how the industry measures GenAI performance, emphasizing the importance of robust benchmarking frameworks that reflect real-world usage. Additionally, the paper presents a comprehensive overview of key metrics across three dimensions: performance (e.g., latency, throughput), quality (e.g., task-based and human-in-the-loop evaluation), and efficiency (e.g., energy consumption, cost per query). Supported by benchmark data and recent research, the analysis highlights the implications of these metrics for scalability, user experience, and sustainability in GenAI systems.

14. Ssemakula, J. B., Kimwise, A. & Balirwa, M., Cavendish University

Title: Embracing Artificial Intelligence for Forecast-Based Energy Optimization: Advancing Sustainable Power Systems Towards SDG Achievement

Keywords:

Artificial Intelligence (AI), Autoregressive Integrated Moving Average (ARIMA) model, Genetic Algorithm (GA), Sustainable Development Goals (SDGs)

The increasing complexity of balancing grid power with renewable energy sources, amid rising global energy demands, under-scores the need for intelligent and cost-effective energy management solutions. This research proposes an Artificial Intelligence (AI)-driven approach that leverages

advanced forecasting and optimization techniques to enhance energy utilization, operational efficiency, and cost reduction. At the core of the system is an Autoregressive Integrated Moving Average (ARIMA) model, trained on historical consumption data to accurately predict energy demand and support real-time decision-making. The framework dynamically toggles between renewable and grid energy sources based on forecasted demand and real-time availability. When conditions are favourable, the system prioritizes renewable energy to reduce reliance on the grid and lower operational costs. In less favourable conditions, it strategically draws on grid power to preserve renewable reserves and maintain uninterrupted supply, or intelligently combines both sources when needed. To address the limitations of static, grid-dependent energy systems, particularly in emerging economies, the proposed model integrates ARIMA with a Genetic Algorithm (GA). This hybrid approach enhances the system's ability to navigate complex, non-linear energy demand patterns by conducting global searches across vast solution spaces, resulting in improved adaptability and optimization accuracy. Aligned with Uganda's Vision 2040 and the United Nations Sustainable Development Goals (SDGs) 7 and 13, this work offers a scalable and sustainable energy management solution. Evaluation results demonstrate notable improvements in cost-efficiency, energy optimization, and system scalability, highlighting the framework's potential to support more resilient and intelligent power infrastructures in growing economies.

15. Ari Niki-Tobi - Former Magistrate Judge in Lagos State judiciary, Nigeria; an adjunct of Criminology and Sociology of Law at the State University of New York, Oneonta

Title: Research on Adopting a Socio-Judicial Approach to Implementing AI in the Court

Key Words: Socio-judicial AI

This research on AI and the Courts began over three years ago and I did my first presentation to female judges at an international conference in CUNY. I demonstrate the dilemmatic implications of AI on litigation, especially criminal trials, and the criminal justice system. I collected data from all judges in attendance, and the findings confirmed my hypothesis. Part B research was conducted at an international conference of Court administrators in Singapore. Therefore, this presentation will discuss the collated results of the last conference research. I will also discuss the

implications of AI to the justice system. In comparing the collated data, I will also discuss AI hiccups in the court system and propose my unique socio-judicialism theory for implementing AI in courts.

The State of Higher Education in Uganda from a Carnegie African Diaspora Fellow Perspective

In 2016, I was one of S9 African Diaspora Scholars (i.e., African-born scholars based at universities in the United States and Canada) who received the Carnegie African Diaspora Fellowships to travel to Africa. Beginning in May 2016, the Scholars travelled to the selected public and private higher education institutions in Ghana, Kenya, Nigeria, South Africa, Tanzania, and Uganda to collaborate on curriculum co-development, research, graduate teaching, and training and mentoring activities.

I travelled to Uganda to work with the Uganda Technology and Management University (UTAMU) on graduate student training and mentoring within the School of Business and Management. I co-led a 10-week graduate training and mentoring project with UTAMU's Dean of the Graduate School. During this period, we covered several important topics including developing a research proposal, an extensive literature review, research design and methodology, as well as how to successfully complete a research project.

In addition, graduate students were provided tips and ideas about effective and timely completion of their reports and how to seek potential outlets for the publication of their research. A list of31 peer-re- viewed, relevant journals was provided to the participants to enable them to select potential journals for their publications. This was critical because most of the doctoral students, including advanced ones, had never had the opportunity to publish their research in peer-reviewed journals in Uganda or globally. In addition to graduate training and mentoring, I was appointed by the Vice Chancellor of UTAMU as Editor-in-Chief of a new online open access interdisciplinary journal called the International Journal of Technology and Management (http://www.ijotm.utamu.ac.ug).

The Fellowship fit well with my personal background, expertise, and professional (sociological) experience. These skills were relevant and transferable to the project activities of graduate training and mentoring. My interactions over the three months with scholars at UTAMU were mutually beneficial; I not only shared my expertise with colleagues at UTAMU, but they felt I was useful to both graduate students and colleagues I worked with on a daily basis for the 1O-week period. I was able to gain new and valuable perspectives on the experiences of both scholars and graduate students in the context of institutions of higher education in Uganda. In particular, the fellowship gave me a rare opportunity to interact with graduate students while engaging with colleagues at UTAMU.

During my fellowship, I had the opportunity to share research and teaching experiences of two contexts of higher education/ learning-the US. and Ugandan contexts-which are very different, but have similar challenges and aspirations. Both the graduate students and colleagues I worked with were extremely excited about my project activities. They were all grateful that I was able to be at their institution for three months working with them on graduate training and mentoring as well as helping to launch a new journal for the institution. For my part, I was very grateful to give back to students in my native country, which I had left in the early 1980s to attend graduate school at the University of California -Berkeley.

Over the three-month stay in Uganda, I learned of the enormous challenges facing the 41 public and private universities (31 private and 10 public). Such challenges include:

- Inadequate funding as these institutions rely primarily on tuition and fees paid by students to fund their operating budgets. Public universi- ties receive additional government funding, but it is insufficient.
- Inadequate academic staff (most vacancies go unfilled due to lack of qualified applicants) and an insufficient number of senior academic staff to conduct research as well as provide quality teaching or supervision of both institutions (especially in and around the capital city of Kampala) and more still, engage in outside consultancies to earn a decent living. This leaves them little time to focus on research or effective teaching and mentoring of students.
- Inadequate to poor infrastructure for teaching/learning, doing research and scholarship. In addition to over-crowded lecture rooms and poorly equipped labs, there are insufficient books and journals, e-libraries, or computers to cater for both students and instructors.
- Administrative problems: most universities employ inexperienced and/ or unqualified individuals in top administrative positions (due to sectarianism, regionalism, or cronyism). In private universities, decision making is a prerogative of Boards of Trustees (mostly owners) and top administration.
- Poor leadership and supervision at the national level: the National
- Council for Higher Education (NCHE) is understaffed and incapable of providing effective monitoring, evaluation, and supervision of the 41 public and private institutions of higher education in the country.

Most of the problems highlighted here can be reversed through adequate funding (diversifying domestic and international sources of income), hiring and adequately compensating high-calibre administrative and academic staff, extending scholarships to students from low-income groups, and promoting student and faculty exchanges (including visiting professors) with universities in the US. and Canada. Indeed, already the Carnegie African Diaspora Fellowship Program (http://bit.ly/2pQ7Dev) facilitates engagement between scholars born in Africa who are now based at universities in the United States or Canada and scholars in Africa on mutually beneficial academic activities.