NIRC
NKUMBA INTERNATIONAL RESEARCH CONFERENCE

NKUMBA INTERNATIONAL RESEARCH CONFERENCE 2026

Theme *Catalysing Research Knowledge & Innovation in Realizing SDGs*

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CONFERENCE PROCEEDINGS

Directorate of Postgraduate Studies and Research
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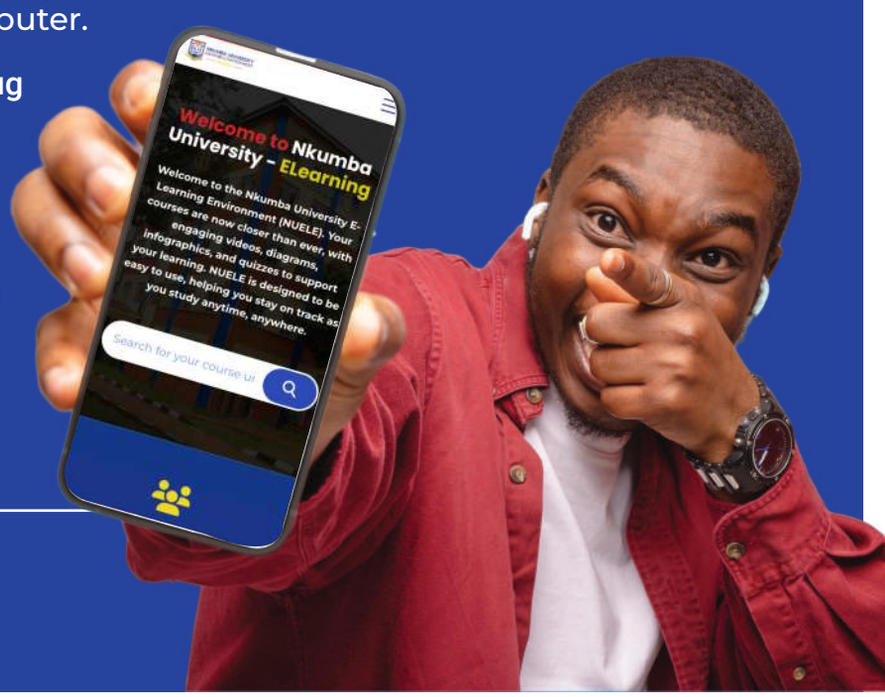

Vice Chancellor, Nkumba University

PROF. JUDE T LUBEGA

It is my great pleasure to welcome you to the Nkumba International Research Conference (NIRC) 2026, convened under the theme: "Catalyzing Research, Knowledge and Innovation in Realizing the Sustainable Development Goals (SDGs)."

This conference reaffirms Nkumba University's commitment to advancing research, fostering innovation, and generating knowledge that addresses contemporary societal challenges while contributing to the realization of the Sustainable Development Goals. Research remains at the heart of sustainable development, and through collaborative scholarship, we can develop practical solutions that transform communities and improve lives.

I am particularly delighted that this year's conference is being organized in partnership with Ndejje University, whose collaboration demonstrates the power of inter-university cooperation in promoting academic excellence and impactful research. On behalf of Nkumba University, I extend our sincere appreciation to Ndejje University for joining us in this important endeavor.

I also wish to express our profound gratitude to our partners and stakeholders who have continuously supported this conference over the years, especially the National Drug Authority (NDA). Your support has helped establish NIRC as a credible platform for scholarly engagement and knowledge exchange.

Our appreciation equally goes to the National Planning Authority (NPA) for its continued support and commitment to promoting research and evidence-based policy formulation that drives Uganda's national development agenda.

As we gather researchers, academicians, policymakers, industry players, and development practitioners from diverse disciplines and backgrounds, I encourage all participants to engage meaningfully, share knowledge generously, and forge partnerships that will strengthen our collective contribution towards sustainable development.

I am confident that the deliberations and outcomes of this conference will inspire innovative ideas and provide actionable recommendations that advance national, regional, and global development aspirations.

I thank you all for your participation and wish you fruitful engagements during the conference.

NIRC Organising Committee 2026

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Executive Director National Planning Authority (NPA)

The Vice Chancellor,

Members of Council and Management,

Distinguished Scholars and Researchers,

Development Partners,

Representatives from Government, the Private Sector and Civil Society,

Students, Invited Guests,

Ladies and Gentlemen.

Good morning.

It is a privilege and honour to join you at the Nkumba University Annual Research Conference 2026. I commend Nkumba University for providing a platform where knowledge is transformed into solutions, research into policy, and innovation into development outcomes.

At a time when nations face complex economic, social, environmental, and technological challenges, universities have never been more important. As Albert Einstein observed, "We cannot solve our problems with the same thinking we used when we created them." The Sustainable Development Goals (SDGs) demand new thinking grounded in evidence, innovation, and practical solutions.

More than two thousand years ago, Socrates reminded us that "The unexamined life is not worth living." Research is society's collective process of examination. Through inquiry and evidence, we understand our challenges, discover opportunities, and chart pathways toward sustainable development.

Ladies and Gentlemen,

Uganda's development aspirations are articulated in the Constitution, Uganda Vision 2040, and the National Development Plans. The current Fourth National Development Plan (NDP IV) prioritizes sustainable industrialization, human capital development, digital transformation, science, technology and innovation, productivity, environmental sustainability, and inclusive socio-economic transformation.

These priorities are, fundamentally, research questions. How do we improve learning outcomes, increase agricultural productivity, create jobs, harness artificial intelligence responsibly, build resilient cities, and industrialize sustainably? The answers will emerge not from rhetoric, but from evidence, research, experimentation, and innovation.

As Aristotle observed, "Knowing yourself is the beginning of all wisdom." For nations, research performs this role by helping us understand our realities, measure progress, and design effective interventions. Effective planning begins with knowledge, and knowledge begins with research.

Distinguished Participants,

Uganda has emerged as one of Africa's leading countries in integrating the SDGs and the African Union Agenda 2063 into national development planning. Alignment with these frameworks increased from approximately 92 percent under NDP II to 97 percent under NDP III, and under NDP IV Uganda is approaching full integration.

However, integration alone is not enough. The key question is which interventions generate the greatest impact across multiple development outcomes.

To answer this, the National Planning Authority, with support from UNECA and UNDP, undertook a Dynamic Analysis of the SDGs and NDP III. The study confirmed that development is a complex system characterized by feedback loops, interdependencies, and dynamic interactions. Progress in one sector influences outcomes in many others.

The analysis identified three strategic accelerators with the strongest multiplier effects across the development system: Environment, Governance, and Industry. Investments in these areas strengthen resilience, improve institutional effectiveness, accelerate productivity, create jobs, stimulate innovation, and drive economic transformation. Together, they were projected to increase Uganda's SDG attainment by more than ten percentage points by 2030.

The study also demonstrated that sustainable development requires complementary investments in education, health, water and sanitation, agriculture, and infrastructure. The lesson is clear: development outcomes improve most rapidly when interventions are designed as integrated systems rather than isolated projects.

This is why research matters. It helps societies understand complexity and provides the evidence required for integrated policy responses. Research is not merely an academic exercise; it is the bridge between aspiration and implementation.

Ladies and Gentlemen,

Universities are far more than centres of teaching. They are producers of knowledge, incubators of innovation, generators of human capital, and strategic partners in national development. Investments in education, research, and innovation may not yield immediate returns, but they generate the productivity, competitiveness, and prosperity upon which sustainable development depends.

The future competitiveness of Uganda will depend less on the resources beneath our soil and increasingly on the knowledge, skills, creativity, and innovative capacity of our people. Today, we can confidently add that research and innovation are among the most powerful instruments through which nations transform their future.

One of the pillars of Uganda's development agenda is human capital development. Sustainable

development begins with investing in people: their education, health, skills, entrepreneurship, creativity, and innovation.

Socrates taught that "Education is the kindling of a flame, not the filling of a vessel." Our responsibility is therefore not merely to transmit knowledge, but to inspire creativity, critical thinking, entrepreneurship, and innovation. We must equip our youth not merely to seek jobs but to create jobs; not merely to consume technology but to develop it; and not merely to adapt to change but to lead it.

Distinguished Guests,

Uganda's Ten-Fold Growth Strategy seeks to expand the economy from approximately US$50 billion today to nearly US$500 billion by 2040. Achieving this transformation will require significant improvements in productivity, value addition, industrial competitiveness, technological adoption, and export growth.

Research and innovation are central to this agenda. Whether in agro-industrialization, tourism, mineral beneficiation, manufacturing, digital innovation, health sciences, renewable energy, climate adaptation, or financial inclusion, sustainable growth is built on knowledge.

The SDGs provide a global framework, but implementation must be local. The challenges facing Uganda and Africa require solutions grounded in our realities and informed by local evidence. We cannot import every solution; we must generate our own knowledge and strengthen indigenous innovation.

This also requires stronger partnerships among academia, government, industry, development partners, and communities. No single institution possesses all the answers. The future belongs to collaborative ecosystems where researchers, policymakers, entrepreneurs, and citizens co-create solutions.

The National Planning Authority remains committed to evidence-based policymaking and to strengthening linkages between research institutions and national development processes. Research must not remain on library shelves. It must inform policy, guide investments, improve service delivery, and transform lives.

As Socrates wisely observed, "The only true wisdom is in knowing you know nothing." This reminds us that learning is continuous and that evidence must remain at the centre of development decision-making.

As we deliberate during this conference, I encourage each of us to reflect on four questions: How can our research contribute more directly to national transformation? How can innovation accelerate SDG achievement? How can universities become stronger engines of development? And how can knowledge be translated into measurable impact?

The measure of our success will not be the number of papers presented, but the quality of solutions generated, partnerships established, innovations commercialized, and lives improved. As Benjamin Franklin noted, "An investment in knowledge pays the best interest."

Ladies and Gentlemen,

The nations that will lead the twenty-first century will not necessarily be those with the largest territories or greatest natural resources. They will be those that produce the most knowledge, nurture the most talent, and transform research into innovation—and innovation into prosperity.

Aristotle reminded us that "We are what we repeatedly do. Excellence, then, is not an act but a habit." Sustainable development is likewise the result of sustained investment in knowledge, innovation, institutions, and people.

As Uganda pursues Vision 2040, the National Development Plan, Agenda 2063, the SDGs, and the Ten-Fold Growth Strategy, let us reaffirm our commitment to building a nation where evidence drives policy, innovation drives competitiveness, and research drives transformation.

I congratulate Nkumba University for organizing this important conference and for its contribution to research, innovation, and human capital development. May this conference generate new ideas, inspire new partnerships, strengthen evidence-based decision-making, and contribute meaningfully to Uganda's transformation.

Together, let us build a Uganda where knowledge drives prosperity, innovation creates opportunities, and research transforms lives.

For God and My Country.

I thank you for your attention.

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Deputy Vice Chancellor Ndejje University

Dr. SAMUEL CHRISTOPHER MAYANJA

Our dear guests, scholars, researchers, students, decision makers, partners, Ndejje university staff, Nkumba University staff, ladies and gentlemen.

It is surely an honour to be part of this very first international academic collaboration between Ndejje University and Nkumba University. This academic conference whose theme is "Catalysing Research, Knowledge and Innovation in Realizing the Sustainable Development Goals," is timely and is part of the academic foundation through which research is shared to contribute to and try to find solutions to challenges in technology, livelihoods, sustainable development, innovation, poverty alleviation, climate change, sustainable development, and others. These opportunities that all scholars are discussing here today are a stepping stone to research, innovation, reshaping the world and improving humanity.

Through the Sustainable Development Goals that were adopted by the United Nations in 2015, this conference is reminding us to use evidence-based research as a stepping stone to call for action on a global arena. For this to be successful, more collaborations like this one will help to share ideas, strengthen collaborations that will bring about transformation through academia.

We academic institutions are the producers of new knowledge and we hold the mantle through which decisions can be made for societal transformation. From this knowledge, we are able to teach, mentor and prepare students to be critical thinkers and innovators whose outcomes inform policy and decision making, develop solutions to challenges globally. We have the opportunity to prepare our students to be the next generation of leaders, scientists, entrepreneurs and change-makers.

We have the opportunities to merge

always adopting the new technologies that allow us to become more impactful, accessible and responsive to society's needs. One of the opportunities is making sure we strengthen the connection between research and societal impact.

A common academic principle says, **"Knowledge generated through research only becomes valuable when it is shared and used to improve society."**

This conference is allowing us to use and share what the various scholars have here today with the decision makers, policy makers, the communities and industry through our conference proceedings, our individual university journals, library repositories both online and physically.

Such collaborations and networking improve teamwork, sustainable solution development and improved innovations. Also, teamwork and empowered grants writing, help researchers think outside the box where research is not only for sharing knowledge but to solve problems, develop critical thinking, empower researchers to be entrepreneurs that translate academic research into industry solutions.

Let us continue to use this talent we have and invest in digital transformation, incubation centres, research funding and interdisciplinary initiatives that empower researchers and students to translate ideas into solutions that allow us to achieve and realize the SDGs. For instance, Uganda lays focus on the ten-fold economic growth strategy by 2040 from USD 50 billion to USD 500 billion, the enablers are the ATMS (Agro-industrialization, Tourism Development, Mineral-based Industrialization, and Science, Technology and Innovation. For such strategies, research and innovation is key in providing solutions to the prevailing challenges and constraints.

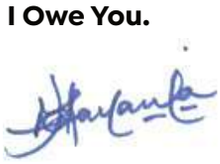
As we strive for this, let us be reminded to ensure the importance of exercising ethical research in academia. Let us adopt certain ideas like artificial intelligence in academia in the most ethical way. Researchers should remain critical thinkers as they use AI. Once we create such environments, we mentor and nurture young researchers to be creative and curious on solving societal problems, improving economic development and ensuring sustainability.

As we engage in discussions during this international conference, let our institutions be the platforms through which scholars generate ideas that enforce policy, strengthen communities, transform lives and create partnerships for working to achieve SDGs, while also bridging the gap between academia and the world of work.

Thank you very much.

The Fear of God Brings Knowledge and Wisdom (Proverbs 9:10)

I Owe You.



Dr. Christopher Samuel Mayanja

Deputy Vice Chancellor Academic Affairs – Ndejje University

Chairperson Nkumba University Council

Director Postgraduate Studies & Research

ASSOC. PROF. SOLOMON MUCHWA ASIIMWE

It gives me great pleasure to welcome you to this conference which represent a significant contribution to the advancement of knowledge, research excellence, and innovation. The theme, "Catalysing Research Knowledge and Innovation in Realising the Sustainable Development Goals (SDGs)", reflects the urgent need for research that does not only expand academic understanding but also addresses the complex challenges facing our societies.

Universities occupy a central role in generating evidence-based solutions through research, and Innovation, and knowledge exchange. As institutions of higher learning, we have a responsibility to ensure that our research responds to contemporary development challenges, supports policy processes, and contributes to sustainable transformation at local, national, regional, and global levels.

The contributions presented in this conference proceedings demonstrate the diversity, creativity, and commitment of researchers in addressing issues related to sustainable development. They provide valuable insights into how knowledge, technology, and innovation can be harnessed to promote inclusive growth, strengthen institutions, improve livelihoods, and advance the achievement of the SDGs.

I commend all researchers, postgraduate students, academics, practitioners, and partners whose dedication has made this conference possible. Your work reinforces the importance of collaboration, interdisciplinary approaches, and partnerships in creating impactful research outcomes.

As we continue to strengthen our research agenda, we must remain committed to promoting a culture of inquiry, innovation, and knowledge dissemination. The journey towards achieving the SDGs requires continuous generation and application of knowledge, and universities must remain at the forefront of this endeavour.

I extend my appreciation to the conference organising committee, reviewers, contributors, and all stakeholders for their commitment and support. In a special way, on behalf of the NIRIC 2026 Organising Committee I extend our appreciation to Nkumba University Management and Ndegye University Management for the support the two universities have given in organising this conference. I encourage Participants and readers to engage with the ideas and findings presented in the conference and these proceedings and to use them as a foundation for further research, innovation, and societal transformation.

Thank you, and I wish you fruitful engagement with these important scholarly contributions.

The Academic Registrar, Nkumba University

DR. FRANK PIO KIYINGI

It gives me great pleasure to extend my warm greetings to all participants, researchers, scholars, and partners contributing to the success of the Nkumba International Research Conference (NIRC) 2026.

This year's conference theme, “Catalyzing Research Knowledge and Innovation in Realizing the Sustainable Development Goals (SDGs),” resonates profoundly with the contemporary role of higher education institutions in generating solutions to the challenges facing humanity. Universities are not only centers of learning but also engines of knowledge creation, innovation, and societal transformation.

On behalf of the Academic Registry, I wish to express sincere appreciation to the Management of Nkumba University and the Management of Ndejje University for embracing the noble task of organizing this inter-university conference. Such collaborations strengthen academic partnerships, promote interdisciplinary engagement, facilitate knowledge exchange, enhance institutional visibility, and create opportunities for joint research and innovation. Above all, they foster a culture of scholarly excellence that transcends institutional boundaries and contributes to national and global development.

I also commend all presenters and researchers whose scholarly contributions have enriched this conference. By tailoring research to address pressing societal challenges, you are providing evidence-based solutions that are instrumental in advancing the realization of the Sustainable Development Goals. Your work demonstrates the indispensable role of research in promoting quality education, good health and well-being, economic growth, environmental sustainability, reduced inequalities, and inclusive development.

Special recognition goes to the Organizing Committee for the dedication,

professionalism, and meticulous planning that have led to the successful execution of this conference. Your commitment and teamwork have laid a firm foundation for meaningful academic discourse and collaboration.

As Academic Registrar, I view this conference as a fulfillment of the very mandate to which institutions of higher learning subscribe. Universities are entrusted with the responsibility of teaching, research, innovation, and community engagement. Through research and the dissemination of knowledge, we contribute directly to the achievement of the United Nations Sustainable Development Goals, which seek to eradicate poverty, improve health and education, promote gender equality, foster sustainable economic growth, protect the environment, and ensure peaceful and inclusive societies for present and future generations.

It is my hope that the deliberations and findings presented in this conference will inspire further inquiry, influence policy formulation, and generate practical solutions that advance sustainable development both locally and globally.

I congratulate all contributors and wish everyone continued success in their academic and professional endeavors.

Dr. Frank Pio Kiyingi (PhD)

Academic Registrar

Nkumba University

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Ndejje University is Uganda's leading Chartered Christian private university, established under a Charter in 2009. It is owned by six dioceses of the Central Region, Namirembe, West Buganda, Central Buganda, Mukono, Mityana, and Luwero, which together constitute the University Consortium and Board of Trustees. The University boasts state-of-the-art modern facilities that support academic excellence across seven

Faculties: Engineering and Survey, Health Sciences, Education and Humanities, Environment and Agricultural Sciences, Business Administration and Management, Science and Computing, and Law. Grounded in strong Christian values, Ndejje University remains committed to providing quality, relevant, and transformative higher education.

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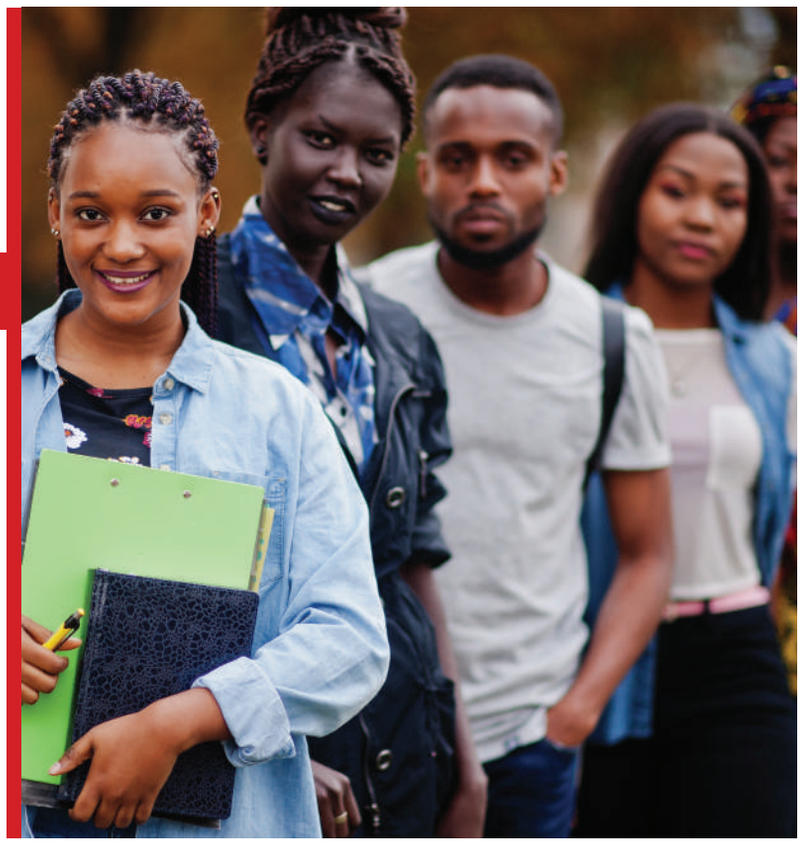

TOPIC

A Photographic Investigation into Developed Public Waste Disposal Practices to Enhance Public Waste Disposal Practices in Uganda-a Developing Country. (Case of Austria and Kampala City)

Keywords: Photographic investigation, Waste disposal practices, Developing countries, Uganda, Austria, Public health, Sustainable cities.

AUTHORS

Oliver Odongo, (SCIAD) Nkumba University.

ABSTRACT

Environmental degradation and poor waste management pose significant threats to public health and economic development, particularly in developing nations. This study utilizes a photographic investigation to compare public waste disposal practices in a developed context (Austria) against those in a developing one (Kampala, Uganda), with the aim of enhancing practices in Uganda. Guided by four objectives, the study employs a comparative research design with qualitative methods, including photography, observation, and studio practice. The findings reveal that while Uganda relies on ineffective litter bins without source separation, open dumping, and waste burning leading to floods and health hazards Austria utilizes color-coded separation bins, strict recycling protocols, and proper animal waste disposal to maintain clean environments. Based on these visual contrasts, the study produces educational posters designed to sensitize the Ugandan public. The research concludes that adopting developed-world waste strategies through visual advocacy is crucial for achieving Sustainable Development Goals (SDGs) related to clean water, sustainable cities, and climate action.

1. INTRODUCTION

The environment is a fundamental determinant of public health standards and economic progress. The World Bank Group (2012) notes that health-impairing pollution can cost countries up to 4% of their GDP annually. In developing countries, deficiencies in solid waste management are highly visible, with urban centres often receiving little to no attention regarding sanitation (UN-HABITAT, 2010).

Uganda exemplifies this challenge. Despite enforcement measures like the National Environment (Waste Management) Regulations (2020), careless waste disposal is rampant. In Kampala, only 40% of the total waste generated is collected and delivered to landfills, leaving the majority to be dumped or burned (Kiggundu, 2024). These practices open dumping, burning, and litteringlead to blocked drainage systems, flooding, and respiratory diseases.

Conversely, developed nations like Austria maintain high standards of environmental cleanliness. Vienna, for instance, is recognized as one of the world's cleanest metropolises (MA 48, 2013). This study posits that visual art forms, specifically photography, remain an underutilized tool for sensitizing the public in Uganda. By visually contrasting the chaotic waste management in Kampala with the structured

systems in Austria, this research seeks to educate the Ugandan population and advocate for behavioral change.

2. METHODOLOGY

The study adopted a Comparative Research Design with a qualitative approach to understand the "why" and "how" of waste disposal behaviors. Data were collected using:

Photography: Capturing and downloading images of waste disposal practices in both Kampala and Austria.

Observation: Direct monitoring of community behaviors and waste sites.

Reading: Reviewing literature on waste management regulations and environmental impacts.

Studio Practice: Using the collected photographs to design educational posters.

A purposive sampling technique was used to select specific locations and subjects that best represented the waste disposal practices in both contexts.

3. RESULTS AND DISCUSSION

The study's findings were organized around the established objectives, revealing a stark contrast between the two contexts.

3.1 Public Waste Disposal Practices in Uganda

Four predominant practices were identified in Kampala:

- **Use of Litter Bins without Separation:** Bins are used but lack source-level separation (individuals, households, and businesses mix waste), complicating recycling efforts.
- **Open Dumping:** Waste is dumped in cars, drainages, and public spaces. This debris lodges in drainage channels, intensifying floods during heavy rains.
- **Waste Burning:** Residents frequently burn waste, releasing greenhouse gases that contribute to climate change and smoke that increases the risk of respiratory and neurological diseases.
- **Animal Waste:** Waste from stray and wandering domestic animals contaminates water sources and the environment.

3.2 Public Waste Disposal Practices in Austria

In contrast, the investigation into Austrian practices (specifically Vienna) revealed:

- **Source-Level Separation:** The use of color-coded bins (e.g., for glass, paper, plastics) facilitates efficient recycling.
- **Sensitivity to Littering**: There is a high public consciousness against littering, resulting in clean streets and public spaces.
- **Recycling over Burning:** Waste is directed to recycling plants rather than being incinerated openly.
- **Proper Animal Waste Disposal:** Pet owners are strictly required to pick up and dispose of animal waste hygienically.

3.3 Educational Interventions

Using the studio practice method, the researcher designed posters incorporating photographs of the superior Austrian practices. These visuals are intended to serve as educational tools for the Ugandan public, demonstrating practical alternatives to current detrimental habits.

4. CONCLUSION AND RECOMMENDATIONS

The study concludes that current public waste disposal practices in Uganda are detrimental to environmental sustainability, public health, and the climate. The gap between Kampala and Austria is not merely technological but behavioral. To bridge this gap, the study recommends:

- **Adoption of Best Practices:** The government should implement developed-world practices such as color-coded, source-level separation bins and investment in recycling plants.
- **Curriculum Integration:** Education on developed waste disposal practices should be integrated into the school curriculum starting from the lowest levels.
- **Localized Communication:** Educational materials and posters should utilize local languages to ensure effective communication.
- **Visual Advocacy:** Photography and videography should be productively utilized by authorities and civil society to visually demonstrate the negative impacts of poor waste management and the benefits of proper disposal.

By leveraging visual evidence and adopting structured international standards, Uganda can enhance its waste management systems and achieve the Sustainable Development Goals 3, 6, 11, 13, and 15.

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TOPIC

Beyond human-centred design: toward a community-centric framework: lessons from ugandan creative practice

Keywords: Community-Centric Design, Human-Centred Design, Ubuntu, decolonial design, social design, Uganda.

AUTHORS

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ABSTRACT

Human-Centred Design (HCD) has become a dominant approach in social design, praised for shifting focus from top-down planning to user empathy. However, this study argues that HCD often falls short in facilitating genuine social transformation due to power imbalances, short-term funding cycles, and a focus on individual "users" rather than collective relationships. Drawing on four community-based creative initiatives in Uganda—KARTwe (Katwe), We Are Walukuba (Jinja), Eco Art Uganda, and the sculptural practice of Leilah Babirye—this paper proposes a shift toward a Community-Centric Design (CCD) framework. Synthesizing insights from Adorno's critique of instrumental rationality, Foucault's power/knowledge dynamics, decolonial theory, and the African philosophy of Ubuntu, the study identifies four interconnected pillars of CCD: sustained engagement, collective ownership, material resourcefulness, and Ubuntu as a relational ethic. The findings suggest that meaningful social design requires ceding decision-making authority to communities, fostering long-term relational commitments, and prioritizing collective well-being over immediate, measurable outputs.

1. INTRODUCTION

While Human-Centred Design (HCD) has improved responsiveness to people's needs, it frequently operates within constraints that limit its transformative potential. Participation in HCD often equates to consultation rather than power-sharing; decision-making authority typically remains with designers or funding bodies. Furthermore, the industry's focus on short-term project cycles and "solutions" overlooks the complex, historical, and relational nature of community life.

This study posits that moving beyond HCD requires shifting the primary unit of analysis from the individual "user" to the "community." It proposes a Community-Centric Design (CCD) model, which reorients design practice from intervention to relationship, and from solution-delivery to stewardship. This argument is grounded in an analysis of four long-term, community-led artistic initiatives in Uganda, a context characterized by complex colonial histories, rapid urbanization, and vibrant cultural traditions.

2. THEORETICAL FRAMEWORK

To critique the limitations of HCD and articulate the CCD model, the study synthesizes four philosophical traditions:

- **Adorno's Aesthetic Theory:** Critiques the instrumental rationality that drives design toward measurable outcomes, advocating instead for open-ended processes that allow for creative emergence.
- **Foucault's Power/Knowledge:** Highlights that design methods are not neutral; they shape who is visible and whose knowledge is valued, necessitating a redistribution of authority.
- **Decolonial Theory:** Challenges the narrative of "expertise" flowing from the Global North to the South, centering local epistemologies and self-determination.
- **Ubuntu Philosophy:** Provides an ethical foundation based on relationality ("I am because we are"), shifting the focus from individual user satisfaction to collective well-being.

3. METHODOLOGY

The study employs a qualitative, interpretive research design utilizing a comparative case study approach. Four Ugandan creative initiatives were selected for their sustained engagement (spanning years rather than months) and deep integration of local participation. Data were drawn from academic literature, project documentation, artist statements, and organizational archives. The analysis identifies recurring patterns across the cases to derive a conceptual framework for Community-Centric Design.

4. CASE STUDY INSIGHTS

The four cases KARTwe (murals in Katwe), We Are Walukuba (arts-led action research), Eco Art Uganda (environmental art from waste), and Leilah Babirye (sculpture) demonstrate how artistic practice can drive social change:

- **KARTwe:** Transformed a marginalized area into an open-air gallery, evolving leadership from external artists to community members over seven years.
- **We Are Walukuba:** Used participatory arts to address land rights and sanitation, establishing community-led institutions like land trusts.
- **Eco Art Uganda:** Converted waste materials into playgrounds and sculptures, fostering environmental stewardship through collaboration.
- **Leilah Babirye:** Utilized reclaimed materials to address issues of belonging and identity, demonstrating that community-centric practice can operate across borders.

5. THE FOUR PILLARS OF COMMUNITY-CENTRIC DESIGN

Comparative analysis revealed four pillars that distinguish CCD from traditional HCD:

- **Sustained Engagement:** Commitment measured in years, not months. Meaningful change requires building trust and relationships over time, resisting the pressure for immediate outputs.
- **Collective Ownership:** Communities participate not just in implementation but in governance and decision-making. Designers act as facilitators rather than experts, ensuring authority remains distributed.
- **Material Resourcefulness:** Treating local and reclaimed materials as assets rather than limitations. This re-centers local capacity and rejects narratives of dependency.
- **Ubuntu as a Relational Ethic:** Success is measured by the quality of relationships strengthened through the design process, rather than just the final product. It shifts the design question from "How do we solve this?" to "How do we strengthen our relationships?"

6. IMPLICATIONS AND CONCLUSION

The CCD framework challenges the role of the designer as an external problem-solver. Instead, it calls for designers to be humble collaborators who support existing community processes.

- **For Education:** Design curricula must integrate critical theory, decolonial perspectives, and relational ethics.

- **For Policy:** Funding structures must move beyond short-term outputs to support multi-year engagement and trust-building.

This study concludes that sustainable social transformation is not a quick fix but a relational practice. By centering community knowledge, power, and time, CCD offers a pathway toward more equitable and locally rooted forms of social change.

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TOPIC

Between sacred and commercial: transformations of ganda ritual pottery in contemporary uganda: an ethnographic practice-based approach

Keywords: Sacred, Commercial, Transformations, Ganda, ritual pottery, Contemporary, Ethnography, Uganda.

AUTHORS

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ABSTRACT

This study examines the shifting relationship between sacred meaning and commercial transformations of Ganda ritual pottery in contemporary Uganda. Historically, Ganda pottery served utilitarian, religious, and cultural identity functions with specific symbolic meanings. However, these forms are increasingly being transformed for artistic display, tourism, and market exchange. Grounded in an ethnographic practice-based fieldwork, the research draws on participant observation, oral narratives, and interviews with potters, ritual specialists, and community elders alongside practice-based studio exploration of pottery-making. The study reveals that Ganda pottery constitutes a rich repository of indigenous knowledge, cultural heritage, and artistic skills. It highlights two primary methods of transformation: repurposing existing ritual forms for secular functions (e.g., lampstands, vases) and modifying forms to create new aesthetic objects. While ritual specialists express reservations about commercializing the sacred, potters argue that vessels only assume sacred status upon dedication in shrines. The research concludes that transforming indigenous pottery forms can promote cultural heritage, tourism, and sustainable economic development, provided a balance is struck between authenticity and innovation.

1. INTRODUCTION

Pottery is among the oldest and most enduring arts of mankind, serving as a critical vessel for understanding the past (Barley, 1994). In Buganda, pottery traces its origins to the reign of Kabaka Kato Kintu (late 13th–early 14th century). The first royal potter, Ssekayila (later Sseddagala), was employed to produce royal cooking pots, establishing pottery as a prestigious profession (Kaggwa, 1934). The Bajjoona (royal ritual potters) held a privileged status, exempt from tax (Luwalo), underscoring the social and symbolic weight of the craft.

In Buganda, belief is inextricably linked to ritual; religious acts gain power through prescribed patterns (Lugira, 2009). Consequently, pottery played a vital role in providing utensils for ritual practices. Many vessels served a dual purpose: tangible utility and intangible social symbolism. For instance, the ensumbi (water pot) serves domestic needs but is also central to shrines for spiritual dedication.
However, the colonial era introduced significant disruptions. The introduction of imported metal and plastic containers diminished the role of pottery in daily life. Furthermore, the spread of Christianity and

Islam led to the demonization of traditional beliefs, branding shrines and by extension, the ritual vessels used within them as "satanic." This has created a gap in knowledge and appreciation of these forms among the younger generation and the elite. Despite these challenges, there is a renewed momentum in repurposing indigenous pottery for the creative industries, driven by cultural tourism and heritage projects (Kwesiga, 2012). This study explores how Ganda ritual pottery can navigate the tension between its sacred origins and its commercial potential in contemporary Uganda.

2. METHODOLOGY

This study employs a multi-modal ethnographic approach, combining participant observation, oral narratives, and interviews with potters, ritual specialists, and community elders in the Kampala and Wakiso districts (Lweeza, Kajjansi, Kibumbiro). Guided by Pink's (2015) emphasis on sensory ethnography and Ingold's (2013) anthropology of making, the research treats material engagement as central to knowledge production. The methodology integrates cultural narrative with practice-based studio exploration. By experimenting with clay and vessel forms in the studio, the researcher gains insights into the technical and aesthetic challenges of transforming ritual objects. This triangulation allows for an analysis of pottery not just as a static artifact, but as a skilled practice embedded in specific cultural and economic environments.

3. RESEARCH FINDINGS

3.1 The Repository of Ritual Forms

The study identified an extensive array of Ganda ritual pottery forms with specific social symbolic purposes. Common vessels found across workshops and shrines include the Ekibya (bowl), Ensumbi (drinking water pot), Ensuwa (water pot), and the Akooto (fire pot). Unique forms dedicated to specific spirits (Lubaale/Musambwa), such as the Ensumbi ya Sewamala or Ensuwa ya Nambi, were also documented.

These forms are produced under the strict guidance of spiritual healers (Balubaala), who receive divine instructions regarding the appearance and finish of the vessels from the spirits. The study found that the scarcity of knowledge regarding these forms is exacerbated by the lack of written records and the colonial stigmatization of indigenous knowledge systems (Ssekagya, 2024).

3.2 Strategies for Transformation

To bridge the gap between sacred tradition and commercial viability, the study explored two methodological approaches to transformation:

Repurposing: Existing ritual forms were adapted to serve utilitarian or aesthetic functions, thereby reducing the stigma associated with their "sacred" or "devilish" origins. For example, the Ensumbi ya Sewamala was transformed into a flower vase and a chandelier base. This method demonstrates how surface enhancement and functional reassignment can change the perception of ritual objects for secular spaces.

Modifying: Through studio experimentation, new forms were created inspired by traditional motifs. The Ensuwa (water pot) inspired a range of contemporary products, including two-dimensional wall hangings and glazed flower vases. These modifications were designed to meet modern functional needs while retaining visual links to heritage.

3.3 Sacred vs. Commercial: Perceptions and Conflicts

The research revealed a tension between ritual specialists and contemporary potters. Elders and spiritual healers expressed reservations about commercializing sacred objects, arguing that it exposes protected norms to public scrutiny. However, potters countered that a vessel only becomes sacred when dedicated to a spirit; until that point, it remains a craft that can serve various purposes.

Findings suggest that ritual pottery survives by shifting between sacred continuity and creative adaptation. It remains indispensable in rituals (marriages, funerals) but gains visibility in tourism, interior design, and museums. Surveys indicate that tourists value these pots as "authentic heritage," while urban Ugandans increasingly view them as decorative craft.

4. CONCLUSION AND RECOMMENDATIONS

Ganda ritual pottery represents a rich intangible heritage deeply rooted in the indigenous religion of the Baganda. While modernization and imported goods threaten artisanal continuity, the creative industries offer a pathway for sustainable economic development. The study concludes that by repurposing and modifying ritual forms, potters can create products that appeal to global markets while preserving the visual language of their culture.

To sustain this balance, the following recommendations are proposed:

- **Documentation:** Urgent documentation of oral histories from potters and ritual specialists is needed to preserve the knowledge of rare and disappearing forms.
- **Education:** Formal art education in Uganda should integrate indigenous pottery forms into the curriculum to encourage the younger generation to draw inspiration from local heritage.
- **Policy & Tourism:** Policymakers should recognize pottery within the heritage economy, integrating it into cultural tourism circuits and enacting intellectual property protections for traditional designs.
- **Exhibition:** Museums and galleries should curate exhibitions that link historical ritual pottery with modern adaptations to educate the public on the evolution of the craft.

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TOPIC

Design Of An Integrated Biogas, Biomass And Solar Bifacial Renewable Energy System For Rural Health Facilities And Teaching Hospitals

Keywords: Bifacial PV, Biomass CHP, Biogas, MILP Optimization, Rural Health, Polygeneration, Pinch Analysis

AUTHORS

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ABSTRACT

Reliable energy access is critical for rural health facilities, where power outages directly impact mortality rates through the failure of life-saving equipment. This study presents the design and optimization of a hybrid polygeneration system integrating Bifacial Solar Photovoltaics (PV), Biomass, and Biogas to meet the electrical, thermal, and cooking fuel demands of a 200-bed rural teaching hospital. Unlike conventional designs relying on diesel backups, this proposed system utilizes a Mixed-Integer Linear Programming (MILP) model optimized within a TEESR (Technical, Economic, Environmental, Social, and Reliability) framework. Pinch Analysis is employed to maximize heat recovery. Simulation results demonstrate an optimal configuration comprising a 350 kWp Bifacial PV array, a 200 kWth Biomass CHP unit, and a 50 m^3/day Biogas digester. The system achieves a Renewable Energy Fraction (REF) of 96.8% and reduces the Loss of Power Supply Probability (LPSP) to 0.7%. Economically, the system achieves a Levelized Cost of Energy (LCOE) of USD 0.087/kWh, offering a 69% reduction compared to diesel generation, with a projected Net Present Value saving of USD 1.8 million over 25 years. The design offers a scalable, resilient, and sustainable energy solution for healthcare infrastructure in resource-limited settings.

INTRODUCTION

Healthcare facilities in developing nations face a dual challenge: rising energy demand and unreliable grid infrastructure. For rural health facilities and teaching hospitals, energy insecurity is not merely an operational inconvenience but a clinical risk. Power interruptions affect Intensive Care Units (ICUs), operating theatres, vaccine cold chains, and sterilization processes, leading to increased morbidity and mortality [1]. Currently, these facilities rely heavily on diesel generators, which are expensive to operate and environmentally damaging.

To address this, we propose a decentralized, hybrid polygeneration system that leverages local renewable resources. By integrating Bifacial Solar PV (for electricity), Biomass (for heat and power), and Biogas (from organic waste), we aim to create a closed-loop energy system. This

paper details the design and optimization of such a system, specifically tailored to the complex load profile of a teaching hospital, which includes clinical, educational, and residential energy demands.

SYSTEM ARCHITECTURE

The proposed polygeneration system is designed to supply AC electricity, steam (for sterilization), domestic hot water, chilled water (for HVAC), and cooking fuel. The architecture consists of three core subsystems:

Solar Bifacial PV Subsystem

The electrical backbone is a 350 kWp Bifacial PV array. Unlike monofacial panels, bifacial modules capture reflected light (albedo) from the ground, increasing energy yield by an estimated 18% based on hospital rooftop reflectivity. The system is coupled with a 500 kWh Lithium Iron Phosphate (LiFePO4) Battery Energy Storage System (BESS) to ensure islanded operation and peak shaving.

Biomass Energy Subsystem

To meet high thermal loads (autoclaving, hot water), a 200 kWth Biomass boiler is integrated. This unit operates as a Combined Heat and Power (CHP) system, feeding an Organic Rankine Cycle (ORC) generator to produce electricity from waste heat. The boiler utilizes locally sourced agricultural residues (rice husk, bagasse, maize cobs), ensuring fuel security and supporting the local agricultural economy.

Biogas Subsystem

A 50 m^3/day anaerobic digester processes organic waste from the hospital kitchen, canteen, and sewage. The produced biogas (60–65% methane) is used primarily for cooking in institutional kitchens, replacing LPG. Excess biogas powers a 20 kWe micro-generator for electrical backup. The system produces nutrient-rich digestate, which is pelletized and sold as biofertilizer.

Energy Management System (EMS)

A rule-based hierarchical EMS manages energy flows. The dispatch logic prioritizes solar PV for direct loads, followed by BESS discharge. Biomass CHP is dispatched for continuous baseload thermal and electrical needs, while the biogas generator handles peak demand. Grid import is utilized only as a final fallback.

METHODOLOGY

The optimization of the system involves three distinct analytical steps:

Load Profiling

A comprehensive energy audit was simulated for a reference 200-bed teaching hospital. Hourly load profiles were constructed, identifying a daily electrical peak of 350 kW, a continuous thermal demand of 180 kW, and a cooking fuel demand equivalent to 15–20 kg of LPG/day.

Mixed-Integer Linear Programming (MILP)

The sizing and operational scheduling of the system components were optimized using a MILP model implemented in Python using the PuLP library and GLPK solver.

- **Objective Function:** Minimize Net Present Cost (NPC) over a 25-year horizon.
- **Constraints:** Energy balance equations, component capacity limits, storage state-of-charge limits, and specific reliability targets (LPSP ≤ 2%).
- **Environmental Constraint:** CO2 emissions must be reduced by at least 90% compared to a diesel-only baseline.

Pinch Analysis

Pinch Analysis was applied to the thermal streams of the hospital (e.g., autoclave steam demand, ORC condenser heat). By constructing Grand Composite Curves (GCC), we identified the minimum hot and cold utility requirements, guiding the design of a Heat Exchanger Network (HEN) to maximize internal heat recovery and reduce biomass fuel consumption.

TEESR Framework

The final system configuration was evaluated using the TEESR (Technical, Economic, Environmental, Social, Reliability) multi-criteria framework. This ensures the solution is not only cost-effective but also socially beneficial and technically robust.

RESULTS AND DISCUSSION

The simulation yielded an optimal system configuration and performance metrics that demonstrate significant improvements over the diesel-only baseline.

Technical and Reliability Performance

The optimized system achieved a Renewable Energy Fraction (REF) of 96.8%.

- **Reliability:** The Loss of Power Supply Probability (LPSP) was reduced to 0.7%, compared to 12.3% for the baseline. This represents a 94.3% improvement in reliability.
- **Energy Not Supplied (ENS):** Reduced from 182 MWh/year to under 15 MWh/year, drastically mitigating the risk of equipment failure during critical procedures.

Environmental Performance

- **Emissions:** The system achieves a 97.2% reduction in CO2 equivalent emissions, dropping from 648 tCO2e/year (diesel) to just 18 tCO2e/year.
- **Waste Management:** The biogas subsystem diverts approximately 18 tonnes of organic waste annually, preventing methane emissions from open dumping.

Economic Performance

The proposed system is highly cost-competitive:

- **LCOE:** USD 0.087/kWh (electricity), significantly lower than the diesel baseline of USD 0.28/kWh.
- **Net Present Cost (NPC):** USD 2.8 million over 25 years, compared to USD 4.6 million for a diesel-dependent system. This yields a saving of USD 1.8 million.
- **Payback Period:** Estimated at 8.5 years with an Internal Rate of Return (IRR) of 11.2%.

Social Impact

The project fosters local development by creating an estimated 12 permanent full-time jobs in operations, maintenance, and biomass logistics. Additionally, the production of biofertilizer provides an indirect economic benefit to local farmers valued at approximately USD 15,000 annually.

CONCLUSION

This study demonstrates that an integrated Biogas–Biomass–Solar Bifacial hybrid system is a technically feasible and economically viable solution for rural health facilities. The application of MILP and Pinch Analysis within a TEESR framework ensures that the design meets the complex reliability requirements of hospitals while minimizing environmental impact. The projected 96.8% renewable autonomy and 97% emission reduction offer a replicable model for sustainable healthcare infrastructure in developing regions. Future work will focus on the pilot implementation of this design and the integration of hydrogen storage for seasonal resilience.

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TOPIC

Design And Modelling Of A Solar Gel Energy System For Sustainable Power In Rural Health Facilities And Teaching Hospitals

Keywords: Solar Gel Pond, Polymer Hydrogel, Thermal Energy Storage, Rural Health Facilities, PV Cooling, COMSOL Multiphysics.

AUTHORS

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ABSTRACT

Energy poverty remains a critical barrier to effective healthcare delivery in Sub-Saharan Africa (SSA), where frequent grid outages force rural facilities to rely on polluting and expensive diesel generators. This paper presents the design and modelling of a novel Solar Gel Energy System tailored for rural health facilities and teaching hospitals. The proposed system integrates a Solar Gel Pond (SGP) for thermal energy storage with a hydrogel-cooled photovoltaic (PV) array for electricity generation. Unlike conventional salt-gradient solar ponds, the SGP utilizes a transparent polymer gel layer (98% water, 2% polymer) to suppress convective heat loss without the maintenance burdens of salt management or evaporation. Concurrently, the hydrogel layer applied to PV panels provides passive evaporative cooling. Numerical simulations using COMSOL Multiphysics and MATLAB/Simulink demonstrate that the SGP achieves stable storage temperatures of 56–64°C, sufficient for sterilization and water heating, while the hydrogel cooling reduces panel operating temperatures by 14.1°C, boosting PV efficiency by 12.9%. The integrated system achieves an electrical Loss of Power Supply Probability (LPSP) of 1.8% and a thermal LPSP of 4.2%. Economic analysis indicates a payback period of 6.5–8.5 years and an 89% reduction in carbon emissions, validating the system as a sustainable, low-maintenance solution for energy-poor healthcare infrastructure.

1. INTRODUCTION

Access to reliable electricity is a prerequisite for modern healthcare, yet approximately 675 million people in SSA lack access to power. In Nigeria and Uganda, rural health facilities operate with grid availability often below 6 hours per day, leading to compromised cold chains, failed sterilization processes, and reliance on costly diesel backups [1, 3]. While solar energy is abundant, conventional Photovoltaic (PV) systems suffer from efficiency degradation at high operating temperatures, and solar thermal solutions typically require complex maintenance.

This study addresses these challenges by proposing a "Solar Gel Energy System." This dual-technology approach uses a Solar Gel Pond (SGP) to provide low-temperature thermal energy for medical heating needs and hydrogel-cooled PV panels to maximize electrical output. The SGP replaces the problematic salt gradient of traditional solar ponds with a stable polymer gel, offering a maintenance-free thermal storage solution ideal for remote facilities.

2. SYSTEM DESIGN

The proposed architecture consists of three integrated subsystems:

Solar Gel Pond (SGP): A rectangular basin featuring an Upper Convective Zone (UCZ), a Non-Convective Gel Zone (NGZ), and a Lower Storage Zone (LSZ). The NGZ utilizes a transparent polymer gel (Carbowax or Polyethylene Glycol) with 97.43% solar transmissivity to trap heat in the LSZ.

Hydrogel-Cooled PV Array: Monocrystalline PV modules equipped with a 3–5 mm rear hydrogel layer. This layer utilizes evaporative cooling to mitigate thermal derating.

Battery Energy Storage System (BESS): Used to balance electrical loads and ensure night-time operation.

A central Energy Management System (EMS) dispatches power to prioritize critical loads (ICU, vaccine refrigeration) and thermal loads (autoclaves, hot water).

3. METHODOLOGY

The system performance is evaluated through a coupled numerical simulation approach:

Thermal Modelling (COMSOL Multiphysics): A 3D finite element model simulates the transient thermal behavior of the SGP. Boundary conditions utilize Typical Meteorological Year (TMY) data for Kampala, Uganda, and Kano, Nigeria.

Electrical Modelling (MATLAB/Simulink): The PV array is modelled using the single-diode equivalent circuit. The effect of hydrogel cooling is integrated by modifying the cell temperature input, where $T_{cell_gel} = T_{cell_base} - \Delta T_{gel}$.

Performance Indicators: Key metrics include Thermal Storage Efficiency (η_{th}), PV System Efficiency (η_{PV}), Loss of Power Supply Probability (LPSP), and Levelized Cost of Thermal Energy (LCOTE).

4. RESULTS AND DISCUSSION

Simulation results for a reference facility (60 kWp PV, 300 m² SGP) highlight the system's robustness:

Thermal Performance: The SGP maintained storage zone temperatures between 56–64°C during dry seasons and 48–56°C during rainy seasons, meeting the 54°C threshold required for sterilization. The gel

layer reduced upward convective losses by 78% compared to free water surfaces, achieving an annual thermal efficiency of 32–38%.

PV Performance: The hydrogel cooling layer reduced peak panel temperatures from 68.4°C to 54.3°C ($\Delta T=14.1\ ^{\circ}C$). This resulted in a 12.9% increase in power conversion efficiency and an additional annual energy yield of 10,500 kWh.

Reliability: The integrated system achieved an electrical LPSP of 1.8% (well below the 3% target for critical health loads) and a thermal LPSP of 4.2%.

Economic and Environmental Impact: The system offers a Levelized Cost of Electricity (LCOE) of USD 0.083/kWh and displaces approximately 228 tCO_2e per year (an 89% reduction). With a simple payback period of 6.5–8.5 years, the system is financially viable compared to diesel-only operations.

5. CONCLUSION

The Solar Gel Energy System presents a transformative approach to powering rural health facilities. By combining the low-maintenance thermal storage of a Solar Gel Pond with the efficiency gains of hydrogel-cooled PV, the design meets the critical electrical and thermal demands of hospitals without relying on grid stability or fossil fuels. The simulations confirm high reliability, significant cost savings, and a substantial reduction in carbon emissions. Future work will focus on pilot-scale experimental validation to verify the numerical models and the long-term stability of the polymer gel in field conditions.

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TOPIC

Aquaculture And Sustainable Food Security In Uganda: Pathways Toward Achieving The Sustainable Development Goals

Keywords: Aquaculture, Food security, Uganda, Econometric modelling, Geographical Information System (GIS), Sustainable Development Goals (SDGs).

AUTHORS

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ABSTRACT

Aquaculture has become the fastest-growing food production sector globally and plays a critical role in addressing food insecurity as capture fisheries approach their biological limits. This study assesses the contribution of aquaculture to sustainable food security in Uganda within the framework of the Sustainable Development Goals (SDGs). A mixed-methods approach was employed, combining time-series analysis of fisheries production data (1990–2024), geographic information system (GIS)-based suitability assessment, key informant interviews, and econometric modelling. Results indicate that Uganda's aquaculture production has expanded from less than 1,000 tonnes in 1990 to over 138,000 tonnes in 2023, yet a national fish deficit of approximately 300,000 tonnes persists. Econometric results show that investment, feed availability, and hatchery capacity are the primary drivers of aquaculture growth (R^2 =0.96). Projection scenarios suggest that aquaculture production could reach up to 1.04 million tonnes by 2035 under an accelerated investment pathway. The study concludes that strategic investments in feed production, hatchery systems, and spatially planned aquaculture development can significantly enhance food security, employment, and economic growth in Uganda while contributing to SDGs 1, 2, 8, and 14.

1. INTRODUCTION

Aquatic ecosystems are increasingly recognized as vital components of global food systems, providing high-quality protein and essential micronutrients. As global fish demand rises and capture fisheries stagnate due to biological limits, aquaculture has become the primary driver of growth in global fish supply [1]. In Uganda, fisheries are crucial for national food security and employment, but capture fisheries in major lakes like Victoria and Kyoga are declining due to overfishing and environmental pressures [2].

Consequently, aquaculture has emerged as a strategic necessity. The sector has transitioned from small-scale earthen ponds to commercial cage aquaculture and intensive tank systems. However, a significant fish deficit persists due to population growth and urbanization. This study analyses the contribution of aquaculture to sustainable food security in Uganda and projects future production scenarios using econometric models to determine pathways toward achieving the SDGs.

2. MATERIALS AND METHODS

The study utilized a mixed-methods approach encompassing:

- **Time-Series Analysis:** Analysis of fisheries production data (1990–2024) from FAO and the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF).
- **GIS Analysis:** Spatial assessment of environmental variables (water depth, temperature, pH, accessibility) to identify suitable zones for cage, pond, tank, and minor lake-based aquaculture.
- **Econometric Modelling:** A regression-based model was developed to estimate the relationship between aquaculture production and key determinants:

$$\ln(Q_t) = \alpha + \beta_1 t + \beta_2 I_t + \beta_3 F_t + \beta_4 H_t + \beta_5 S_t + \beta_6 P_t + \varepsilon_T$$

Where Q_t is production, I_t is investment, F_t is feed availability, H_t is hatchery output, S_t is production systems index, and P_t is species diversification.

- **Projections:** A compound growth model was used to forecast production up to 2035 under low, moderate, and accelerated investment scenarios.

3. RESULTS AND DISCUSSION

3.1 Production Trends and Suitability

Uganda's aquaculture production has grown exponentially from 973 tonnes in 1990 to an estimated 140,000 tonnes in 2024. Despite this, a national deficit of ~300,000 tonnes remains. GIS analysis identified the Lake Victoria Basin as the most critical zone for cage culture, while Northern and Western Uganda show high potential for earthen ponds and tank-based systems. Zoning strategies were developed to recommend stocking densities (e.g., 50,000–100,000 fish/ha for Tilapia in the Lake Victoria Basin).

3.2 Econometric Drivers

The regression model ($R^2 = 0.96$) identified Investment ($\beta_2 = 0.36$) and Feed Availability ($\beta_3 = 0.29$) as the strongest drivers of production, followed by Hatchery Output ($\beta_4 = 0.21$). This indicates that capital infusion and input supply chains are more critical than time trends or system diversification alone.

3.3 Future Scenarios and SDG Linkages

Projections to 2035 vary significantly based on investment levels:

- **Low Growth:** ~487,000 tonnes (12% annual growth rate).
- **Moderate Growth:** ~651,000 tonnes (15% annual growth rate).
- **Accelerated Growth:** ~1.04 million tonnes (20% annual growth rate).

Achieving the accelerated scenario would require an estimated investment of USD 1.4 billion, primarily in industrial feed, hatcheries, and processing infrastructure. This expansion directly supports SDG 2 (Zero Hunger) by closing the fish deficit, SDG 1 (No Poverty) and SDG 8 (Decent Work) by creating an estimated 300,000 jobs along the value chain, and SDG 14 (Life Below Water) by relieving pressure on wild stocks.

4. CONCLUSION

Uganda possesses the potential to transform into a regional aquaculture powerhouse. The study demonstrates that with targeted investments in feed, hatcheries, and infrastructure, aquaculture production can surpass one million tonnes by 2035. Realizing this potential requires robust public-private partnerships and the implementation of spatial development plans to ensure environmental

sustainability. Strategic policy support is essential to unlock the sector's full contribution to the Sustainable Development Goals.

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TOPIC

Irrigation Farming Adoption and Livelihood Outcomes among Smallholder Farmers in Uganda: A Cross-sectional Analysis

Keywords: Irrigation Farming, Livelihood Outcomes, Smallholder Farmers, Uganda

AUTHORS

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Abstract

Agriculture remains the backbone of rural livelihoods across sub-Saharan Africa, underpinning food security and economic stability for millions of smallholder farmers. Globally, irrigation farming is recognized as a critical driver of agricultural intensification, enabling farmers to overcome rainfall variability, increase crop yields, and enhance household welfare (World Health Organization [WHO], 2018). While extensive research in Ethiopia and Ghana has demonstrated the transformative potential of motorized pumps and climate-smart irrigation technologies (Tesfaye et al., 2021; Agula et al., 2018), empirical evidence regarding these dynamics in Uganda remains limited. Smallholder farmers in the Teso Sub-Region of Uganda face persistent challenges such as rainfall variability and low productivity. This study addresses a critical gap by evaluating how irrigation farming adoption influences the livelihood outcomes of smallholder farmers in Uganda, providing evidence necessary for informing policy and practice aimed at enhancing sustainable livelihoods.

Methodology

The study employed a cross-sectional design to assess the link between irrigation adoption and livelihood outcomes. The target population included smallholder farmers in selected districts of the Teso Sub-Region. Using the Krejcie and Morgan (1970) formula, a sample size of 422 was determined; however, 387 farmers participated, yielding a 91.7% response rate. A non-probability sampling technique was applied, with purposive selection of districts, sub-counties, and specific farmers to ensure proportional representation based on the extent of irrigation farming. Data were collected using structured questionnaires and analyzed using SPSS and STATA 18. The analytical approach included descriptive statistics, Pearson's Chi-square tests, and regression models. Statistical assumptions such as linearity and multicollinearity were checked, and Poisson regression and mixed models were utilized to enhance the robustness of the findings.

Results

The study revealed a stark contrast between irrigation technology adoption and livelihood outcomes. The adoption of modern irrigation technologies was generally low; mean scores for drip, sprinkler, pump, hose pipe, and solar-powered systems were all below 2.0, indicating very low uptake. Small-scale manual methods (e.g., buckets) showed moderate adoption (Mean = 2.695, SD = 1.498), with an overall irrigation adoption mean of 1.973 (SD = 0.897). Conversely, livelihood outcomes were consistently high across all measured dimensions. Agricultural productivity was high (Mean = 3.802, SD = 0.688), as were income growth (Mean = 3.672, SD = 0.894) and asset growth (Mean = 3.760, SD = 0.795). Food security and access to social services were rated very high, with means above 4.2. The overall livelihood outcome mean was 3.963 (SD = 0.577).

Bivariate analysis indicated a weak but statistically significant positive relationship between irrigation adoption and livelihood outcomes ($r = 0.208$, $p = 0.000$). Regression analysis confirmed that irrigation adoption significantly predicts livelihood outcomes ($\beta = 0.134$, $p = 0.000$), explaining 4.1% of the variation in livelihood status.

Conclusion and Recommendations

The findings highlight a paradox: while farmers report high livelihood outcomes, this is largely driven by traditional practices rather than modern irrigation adoption, which remains constrained by structural barriers such as high costs and limited access to credit (Tesfaye et al., 2021; Birhanu et al., 2023). Although the explanatory power of irrigation is modest (4.1%), its positive impact is significant. Furthermore, farmers expressed strong willingness to adopt modern technologies if barriers were removed. To unlock the full potential of irrigation for climate adaptation and productivity, the study recommends that the government and stakeholders prioritize subsidies, targeted credit schemes, and stronger extension services to improve the affordability and accessibility of modern irrigation technologies for smallholder farmers.

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MA. Public Administration and Management	2 years	WKD, DL
MA. Public Relations & Strategic Communication	2 years	WKD
MA. in Security and Strategic Studies	2 years	WKD, DL
MA. in Monitoring and Evaluation	2 years	WKD, DL
MA. in Community and Development studies	2 years	WKD, DL
MA. Human Rights and Human Dev't	2 years	DL
MSc. Counseling Psychology	2 years	DL
PGD. Counselling Psychology	2 years	DL
PGD. Diplomacy and global studies	1 years	WKD, DL
PGD. Monitoring and Evaluation	1 years	WKD, DL
PGD. in Public Administration and Management	1 years	WKD, DL
PGD. in Legislative Studies	1 years	WKD, DL
PGD. in Public Relations and Strategic Communications	1 years	WKD, DL

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BA. Community and Development Studies	3 years	FT, WKD, DL
BA. International Relations and Diplomacy	3 years	FT, WKD, DL
BA. Public Administration and Management	3 years	FT, WKD, DL
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Bachelor of Social Work & Social Administration	3 years	FT, WKD, DL
BSc. Guidance and Counseling	3 years	DL
BSc. Journalism and Public Relations	3 years	FT, WKD
Dip. Community and Development Studies	2 years	FT, WKD, DL
Dip. Guidance and Counselling	2 years	DL
Dip. International Relations and Diplomacy	2 years	FT, WKD, DL
Dip. Journalism and Public Relations	2 years	FT, WKD
Dip. Public Administration and Management	2 years	FT, WKD, DL
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BSc. in Environmental Management	3 years	FT, WKD
BSc. in Hotel Mgt and Institutional Catering	3 years	FT, WKD
BSc. in Agribusiness	3 years	FT, WKD
BSc. Public Health	3 years	FT, WKD
BSc. Fisheries Management and Technology	3 years	FT, WKD
BSc. in Human Nutrition and Clinical Dietetics	4 years	FT, WKD
BSc. in Medical Records and Health Informatics	4 years	FT, WKD
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Diploma in Tourism Operations Management	2 years	FT, WKD
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Master of Procurement and logistics Management	2 years	WKD, DL, KLA
Master of Taxation Management	2 years	WKD, DL, KLA
PGD in Office Management and Secretarial Studies	1 year	FT, WKD, DL
PGD in Business Administration	1 year	FT, WKD, DL
PGD in Supply Chain Management	1 year	FT, WKD, DL
PGD in Human Resource Management	1 year	FT, WKD, DL

Undergraduate Programmes

Bachelor of Business Administration Accounting & Finance or Banking & Insurance Management	3 years	FT, WKD
Bachelor of Human Resource Management	3 years	FT, EVE, WKD, DL
Bachelor of Clearing and Forwarding	3 years	FT, EVE, WKD
Bachelor of Business Information Technology	3 years	FT, EVE, WKD
Bachelor of Procurement & Logistics Mgt	3 years	FT, EVE, WKD
Bachelor of Records & Information Mgt	3 years	FT, EVE, WKD
Bachelor of Office Mgt & Secretarial Studies	3 years	FT, EVE, WKD

Diploma Level

Diploma of Business Administration	2 years	FT, EVE, WKD, DL
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Diploma in Administration and Information Processing	2 years	FT, EVE, WKD, DL
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Higher Education Certificates (NCHE)

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NC in Clearing and Forwarding	2 years	Full Time
NC in Library and Information Science	2 years	Full Time
NC in Procurement and Logistics	2 years	Full Time
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TOPIC

Silent Emergency: A Desk Review of the Escalating Mental Health Crisis Among Ugandan Adolescents (2021–2026)

Keywords: Adolescent Mental Health, Uganda, Post-Pandemic, School-Based Stress, Mental Health Policy, Silent Emergency.

AUTHORS

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ABSTRACT

Uganda's adolescent population (ages 10–19) is experiencing a "Silent Emergency"—a rapid, systemic escalation of mental health disorders that remains largely invisible in national health and education discourse. Following the world's longest nationwide COVID-19 school closure (22 months), the psychological landscape has shifted from localized stress to a pervasive crisis. This desk review evaluates the prevalence, drivers, and systemic barriers to mental healthcare among Ugandan adolescents between 2021 and 2026, focusing on the disconnect between national policy and grassroots implementation. A qualitative desk review methodology was utilized, synthesizing 30 recent sources, including peer-reviewed journals, UN/NGO reports, and policy documents. Data were thematically coded across four pillars: prevalence, etiology, cultural-systemic barriers, and policy-implementation gaps. Findings reveal alarming disparities: out-of-school adolescents in urban settings like Kampala exhibit significantly higher depression rates (21.5%) compared to their in-school peers (14.0%). Key drivers include the "lockdown lag," academic pressure, poverty, and gender-based violence. Despite the existence of the Ministry of Health's Child and Adolescent Mental Health (CAMH) Policy Guidelines, implementation remains fragmented due to chronic underfunding, severe shortages of trained professionals, and deep-rooted cultural stigma. To address this silent emergency, the study recommends the urgent integration of mental health literacy into Uganda's Competency-Based Curriculum (CBC), the decentralization of care through school-linked task-sharing models, and treating adolescent mental health as a strict cross-sectoral priority.

1. INTRODUCTION

With over 78% of its population under the age of 30, Uganda's national development trajectory is inextricably linked to the well-being of its youth. However, between 2021 and 2026, a "Silent Emergency" has emerged. The 22-month nationwide school closure during the COVID-19 pandemic disrupted critical social development and learning trajectories, unmasking long-standing deficits in adolescent mental health services. What was once viewed as isolated stress has evolved into a chronic, system-level failure to protect adolescent mental health. This paper maps the quantitative burden and the glaring policy-practice gaps shaping this crisis among Ugandan adolescents aged 10–19.

2. METHODOLOGY

The study employed a qualitative desk-review methodology to synthesize secondary data from 30 sources published between 2021 and 2026. The sample included 18 peer-reviewed journal articles, 6 government policy documents (from the Ministry of Health, NPA, and UBOS), and 6 international/NGO reports. Inclusion criteria required that sources explicitly focus on Ugandan adolescents (10–19 years) and report quantitative prevalence data, risk factors, or policy-implementation findings. Data were coded into four analytical pillars: (1) Prevalence and distribution, (2) Etiology and drivers, (3) Cultural and systemic barriers, and (4) Policy and implementation gaps.

3. KEY FINDINGS

3.1 Prevalence: The Data of the Crisis

The review reveals that nearly one in five adolescents in surveyed areas exhibits signs of an emotional or behavioral disorder, with critical variations based on schooling status, gender, and geography.

The Urban Divide: In Kampala, out-of-school adolescents are significantly more vulnerable than their in-school peers. A 2025 mixed-methods study using the PHQ-9 and GAD-7 scales found depression prevalence at 21.5% among out-of-school youth, compared to 14.0% among in-school adolescents. Anxiety followed a similar pattern (17.5% vs. 10.3%).

High Symptom Burden: In a nationally representative survey spanning post-conflict (Gulu) and non-conflict (Masaka) districts, 67.5% of school-going adolescents reported at least mild depressive symptoms, with 34.1% experiencing moderate to severe symptoms.

Vulnerable Subgroups: Girls, senior secondary students, adolescents living with HIV, and youth in climate-vulnerable regions (e.g., Manafwa Watershed, where 65% report general mental health challenges) bear a disproportionate burden.

3.2 Etiology and Drivers

The crisis is not driven by a single factor but by an ecology of structural disadvantages. Key drivers include the lingering "lockdown lag," intense academic pressure, familial conflict, and socioeconomic stressors such as urban overcrowding and rural poverty. Gender-related drivers are pronounced, with girls reporting higher rates of anxiety linked to economic strain, early marriage fears, and gender-based violence.

3.3 Cultural and Systemic Barriers

The crisis remains "silent" due to deeply entrenched cultural and systemic barriers. In both rural and urban settings, mental illness is frequently attributed to spiritual affliction, "weakness," or divine retribution, driving families toward traditional healers rather than biomedical services. Adolescents conceal symptoms to avoid being labeled "mad." Systemically, there is a stark geographic mismatch: over 60% of psychiatric facilities are located in or near Kampala, despite 88% of the population residing in rural areas.

3.4 Policy and Implementation Gaps

While the Ministry of Health's Child and Adolescent Mental Health (CAMH) Policy Guidelines (2022) prioritize preventive, school-based programming, ground-level reality tells a different story. A 2025 national survey found that very few secondary schools possess formal mental health policies, routine screening protocols, or trained staff. Mental health concerns remain subsumed under disciplinary frameworks rather than treated as health issues.

4. CONCLUSION AND RECOMMENDATIONS

Uganda's adolescent mental health prevalence rates align with, and in some dimensions exceed, global post-pandemic averages, underscoring the public health urgency of this "Silent Emergency." The gap between national policy commitments and everyday realities in schools and clinics is widening. To avert a generational crisis, Uganda must:

Integrate Mental Health Literacy into the Competency-Based Curriculum (CBC) to reduce stigma and build resilience.

Decentralize Care through task-sharing models, equipping teachers and community health workers to identify and refer at-risk youth.

Enforce Policy Implementation in schools by mandating routine mental health screenings and establishing clear referral pathways to primary healthcare.

Prioritize Gender and Equity-Sensitive Programming targeting out-of-school youth, girls, and climate-affected populations.

TOPIC

Perceptions of the Quality of Services Provided by the 'Improved' Community Health Fund in Tanzania: Does the Involvement of Private Health Facilities Really Matter?

Keywords: Perceptions, Community Health Fund, Health Insurance, Quality of Care, Private Health Facilities, Tan

AUTHORS

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Governance, Faculty of Leadership and Management Sciences, The Mwalimu Nyerere Memorial Academy, Dar es Salaam, Tanzania.

ABSTRACT

Healthcare access and quality are fundamental determinants of well-being, particularly in developing countries where community-based health insurance schemes are heavily relied upon to protect informal sector populations from catastrophic health expenditures. In Tanzania, the Community Health Fund (CHF) was established in 2001 as a flagship program for healthcare coverage. To address persistent challenges, the scheme was recently "improved" through the strategic involvement of private health facilities, aiming to broaden healthcare options and enhance service quality. However, the actual impact of this integration on members' perceptions of service quality remains largely unexamined. Anchored in the Consumer Theory of Health Insurance and Institutional Theory, this quantitative study investigates the perceptions of healthcare quality under the improved CHF in two distinct regions: Dodoma and Kilimanjaro.

Drawing on data from 668 household surveys (342 in Dodoma and 326 in Kilimanjaro) collected between 2017 and 2018, the study utilized cross-tabulations, frequencies, and chi-square tests to compare regional experiences. The findings reveal that while both regions share similarities in CHF card usage, premium affordability, and agreement that the scheme increases healthcare access, significant regional disparities exist. Notably, Dodoma exhibited higher CHF renewal rates and a significantly greater proportion of households reporting actual benefits from the scheme (81.25% in Dodoma vs. 68.89% in Kilimanjaro). Conversely, Kilimanjaro respondents reported higher satisfaction with CHF enrollment officers.

Crucially, the study uncovered systemic challenges that persist despite private facility integration. A significant majority of respondents across both regions reported perceived discrimination, noting that health professionals treated CHF cardholders worse than non-members who pay out-of-pocket. Furthermore, respondents indicated that CHF members still faced longer waiting times and continued to incur high out-of-pocket user fees at the point of care, undermining the core objective of the insurance. The study concludes that the mere inclusion of private facilities in the CHF does not automatically translate to improved perceived service quality. It recommends tailored regional interventions, stricter enforcement of equitable treatment standards, and a critical review of benefit packages and hidden costs to ensure the CHF achieves its mandate of equitable healthcare delivery in Tanzania.

1. INTRODUCTION

The design of health insurance plans is a critical factor in protecting households in the informal economy from the financial vulnerabilities associated with ill health. In Tanzania, the Community Health Fund (CHF) was introduced in 2001 as a voluntary, pro-poor scheme targeting the informal sector. While the scheme successfully reduced upfront barriers to care, systemic issues regarding the quality of care and limited benefit packages have historically led to low enrollment and high dropout rates.

To address these bottlenecks, the CHF underwent structural modifications, most notably the inclusion of private health facilities in its network. This integration was a strategic move intended to increase the range of healthcare options available to beneficiaries, thereby theoretically improving service quality and patient satisfaction. However, health insurance choice is not made on utility alone; it is highly dependent on the actual lived experiences and perceived quality of care. This study seeks to fill a critical empirical gap by investigating whether the involvement of private health facilities in the "improved" CHF has genuinely enhanced members' perceptions of healthcare quality, or if underlying systemic challenges remain unresolved.

2. METHODOLOGY

The study employed a quantitative cross-sectional research design. Data were derived from 668 household surveys conducted between July 2017 and January 2018. The sample was drawn from two regions representing major CHF interventions: Dodoma (n=342; covering Bahi and Chamwino districts) and Kilimanjaro (n=326; covering Moshi and Siha districts). These districts were purposively selected to represent both high-performing and low-performing CHF enrollment areas.

Data collection utilized structured questionnaires measuring general CHF experiences, registration processes, healthcare service quality, benefit perceptions, and systemic challenges. Responses were recorded on 5-point Likert scales and categorical options. Data analysis was performed using descriptive statistics (frequencies, percentages, means) to summarize respondent profiles and experiences. Chi-square (χ^2) tests of independence were subsequently applied to identify statistically significant differences in perceptions and experiences between the two regions.

3. KEY FINDINGS

Socio-Demographic and Enrollment Disparities: While gender and age distributions were statistically similar across regions, significant differences emerged in socio-economic status. Kilimanjaro respondents were significantly more educated, wealthier, and more likely to reside in rural areas than those in Dodoma. Despite this, active CHF enrollment was significantly higher in Dodoma (54.09%) compared to Kilimanjaro (34.25%).

Quality of Care and Discrimination: The most striking findings related to healthcare service delivery. A significant regional disparity was found in perceived healthcare quality ($\chi^2 = 26.7084$, $p = 0.000$). Furthermore, the study revealed a pervasive issue of perceived discrimination: across the total sample, a majority of respondents (59.76%) disagreed or strongly disagreed that health professionals treated CHF cardholders better than non-members. This perception of discriminatory treatment was significantly more pronounced in Dodoma ($\chi^2 = 39.9216$, $p = 0.000$).

Persistent Structural Challenges: Despite holding a valid insurance card, 75.25% of respondents reported that they did not truly benefit from the CHF because they still had to pay high out-of-pocket user fees at the point of treatment. Additionally, 84.16% believed the quality of services provided to CHF members was worse than that provided to non-members, and 48.51% reported experiencing longer waiting times.

Benefits vs. Renewals: Paradoxically, while Dodoma respondents faced harsher perceptions of discrimination, they reported significantly higher actual benefits from the CHF (81.25% vs. 68.89%) and significantly higher plan renewal rates (96.76% vs. 91.07%) compared to Kilimanjaro.

4. CONCLUSION AND IMPLICATIONS

The involvement of private health facilities in Tanzania's CHF has not inherently resolved the deep-seated challenges of service quality and patient satisfaction. While the scheme is successfully recognized for increasing access and reducing catastrophic health costs theoretically, the reality at the point of care is marred by perceived discrimination against cardholders, hidden out-of-pocket costs, and long waiting times.

The findings suggest that private facility integration alone is an insufficient lever for improving healthcare quality if provider incentives and behavioral norms are not concurrently addressed. The fact that a majority of insured individuals feel they receive inferior care compared to cash-paying patients points to a fundamental flaw in provider reimbursement structures and enforcement of service standards. For Tanzania's ongoing efforts to achieve universal health coverage, policymakers must move beyond expanding provider networks to implementing strict regulatory frameworks that mandate equitable treatment of CHF members, eliminate illicit user fees, and ensure that the "improved" CHF delivers on its promise of dignified, high-quality healthcare for the informal sector.

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TOPIC

Artificial or Human Intelligence: A Social Sciences Perspective to a Cautious Integration of AI in the Academia.

Keywords: Artificial Intelligence, Human Intelligence, Social Sciences, Higher Education

AUTHORS

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Abstract

In 2023, the United Nations Economic and Social Council (UNESCO) warned against the over use of technology such as smart phones and computers in education noting that their benefits tend to disappear when used in excess (Carbonaro 2023). The revolution caused by technology in the education sector is not deniable but critical voices have warned that attention must be paid to how it is used. Artificial intelligence is one of technological tools that have been widely adopted in the education sector. Coined by John McCarthy, artificial intelligence is a branch of computer science that is focused on creating systems that can perform tasks that normally require human intelligence (Myers 2011). Stryker and Kavlakoglu described AI as technology that enables computers and machines to stimulate human learning, comprehension, problem solving, decision making, creativity and autonomy (Stryker and Kavlakoglu 2026). Human Intelligence is the ability of a subject/individual to construct (design, create, generate) and come up with a solution to a problem (Voroshilov n.d). Psychologists argue that the best distinguishing feature of human intelligence is the ability to process and share vast amounts of information (Cantlon 2024). Human Intelligence is increasingly facing competition from Artificial intelligence especially due to the latter's systems dependence on statistical and mathematical models to analyze massive datasets, identify patterns and use these to predict, infer or generate outputs in response to user prompts (Thibaud 2025).

In the education sector, AI and its associated tools such as Chatgpt and google gemini, semantic scholar and research rabbit have increasingly grown relevant in enabling the academic world to explain difficult concepts, summarize readings, identify research gaps and map citation networks. Their rapid usage has attracted both enthusiasm and pessimism with defenders highlighting the opportunities for efficiency, personalized learning, data analysis and administrative automation. In Africa, AI has aided in reduction of classroom overcrowding by supporting personalized learning despite challenges in terms of infrastructure availability and human and institutional capacity gaps to govern AI to optimize benefits

and minimize harms (Prateek and Bhanu 2021). In Uganda, despite being at early stages, institutions of higher learning have witnessed growing adoption of AI and the associated digital learning tools.

It is worth noting that that rapid technological development bring multiple risks and challenges that may outpace any regulatory frameworks. UNSCO expressed that while the digital revolution has immense potential benefits, attention ought to be paid to the way it is used in education including prevention against any possible detriments (such as diverted attention) to both teachers and students (Carbonaro 2023). Critics argue that that the reliance on AI has caused the 'death' of foundational values of the academic world. For instance, while traditional assessments were intended to reflect a person's knowledge and abilities, today, academic institutions are resorting to oral exams, presentations and easy to automate take home assignments that accurate measurement of learning. In 2025, *The Guardian* reported that in a discussion on whether *AI will be a life skill,* participants challenged the argument that AI is a life skill for students to prepare for the labor market was not convincing enough. Rather, they held that AI, through its large language models (LLM) tools such as Chatgpt undermines teaching and learning, bypasses reflection and criticality and deflects students from reading original material(McCann and Sweeney 2025). The authors argued further that students tend to misuse AI, teachers channel assessments through chatgpt, disrespect university feeble guidance and rules, eventually producing factually incorrect output.

This paper approaches the integration of AI into academic environment from a social sciences perspective. Notably, social sciences concerns about equity and fairness, recognizing that for instance, students with ease in accessing AI tools may gain more advantages over those without. These differences in digital capacities can generate new inequalities and further widen educational disparities especially in countries of the developing world where the gap between the rich and the poor is already too wide. Borrowing from the Critical social theorists that interrogate questions relating to power, inequality, control and social justice, the paper argues that wholesome adoption of AI will only serve the interests of the minority and disadvantage the majority. While the author is cognizant of the irreversibility of AI in the academic world, the call is to ensure that the integration is human-centered (avoid passivity of learners, be cautious about social inequalities leading to exclusion and injustice as well as avoiding false mastery). The paper further recommends that a balanced approach that preserves human intelligence and ethical reasoning and consider AI as a complementary aspect in the academics rather than a substitutive one.

TOPIC

Emerging Technologies and Sustainable Mining Practices in Tanzania: Innovations, Challenges, and Strategic Pathways

Keywords: Sustainable mining, emerging technologies, low-impact practices, operational efficiency, environmental footprint, Tanzania.

AUTHORS

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ABSTRACT

The mining sector is a fundamental engine of economic development in Tanzania; however, it remains one of the most environmentally and socially intensive industries. While global discourse emphasizes the integration of emerging technologies and low-impact practices to align mining with the Sustainable Development Goals (SDGs), a significant knowledge gap exists regarding the localized adoption and impact of these innovations in Tanzania. Grounded in the Theory of Technological Innovation, Sustainable Development Theory, and Stakeholder Theory, this study investigates the role of emerging technologies and low-impact methods in enhancing operational efficiency and environmental sustainability in Tanzanian mining operations.

Employing a mixed-methods research design, the study collected data from 100 diverse mining stakeholders including government officials, mining employees, community members, and technical experts through structured surveys and key informant interviews (KIIs). Quantitative data were analyzed using descriptive statistics, while qualitative data underwent thematic analysis.

Findings reveal a strong stakeholder consensus (Mean scores > 4.0) that automation, real-time safety monitoring, and renewable energy integration significantly improve operational efficiency, reduce downtime, and enhance worker safety. Similarly, low-impact practices such as controlled blasting, mechanized excavation, and water recycling are proven to lower operational costs and mitigate environmental footprints. Despite these recognized benefits, the widespread adoption of sustainable practices is severely constrained by financial limitations (75%), limited technical capacity (72%), regulatory bottlenecks (70%), and restricted access to modern technology (68%). Qualitative insights confirm that without government-backed incentives and targeted capacity building, these technologies remain underutilized, particularly among artisanal and small-scale miners. The study concludes that while technological innovations offer a viable pathway for sustainable mining, realizing their full potential requires strategic interventions, including financial support mechanisms, comprehensive training programs, and the harmonization of regulatory frameworks.

1. INTRODUCTION

Tanzania's mining sector has experienced tremendous growth over the last two decades, driving government revenues and employment. However, this expansion has concurrently accelerated environmental degradation, social tensions, and operational inefficiencies. Globally, the industry is

leveraging emerging technologies such as automated machinery, digital monitoring, and renewable energy to mitigate these impacts. In Tanzania, however, the adoption of these technologies remains sporadic. Existing literature highlights the broader need for sustainable mining in Africa, yet empirical evidence detailing how technological innovations and low-impact practices are specifically integrated into the Tanzanian socio-economic and regulatory context remains scarce. This study addresses this gap by evaluating the actual impact of these innovations and identifying the structural barriers hindering their scalable adoption.

2. METHODOLOGY

The study utilized a mixed-methods approach to ensure comprehensive data triangulation. A stratified random sampling technique was used to select 100 respondents for a quantitative survey, representing government officials, mining company personnel, local community members, and technical experts. Surveys utilized 5-point Likert scales to measure perceptions of technology impact and adoption barriers. Complementing this, purposive sampling was used to conduct semi-structured Key Informant Interviews (KIIs) with senior mining managers and government regulators. Quantitative data were analyzed using means and standard deviations, while qualitative data were processed using thematic analysis to identify recurring patterns regarding operational challenges and strategic needs.

3. KEY FINDINGS

Role of Emerging Technologies: Survey results indicate high stakeholder approval for technological interventions. Real-time safety monitoring technologies (wearables and sensors) recorded the highest impact (Mean = 4.3, SD = 0.6), followed closely by automation technologies like autonomous drilling (Mean = 4.2, SD = 0.8). Stakeholders confirmed that renewable energy integration (Mean = 4.1) effectively reduces carbon emissions, though advanced ore processing technologies showed lower adoption rates (Mean = 3.7) due to complexity and cost.

Impact of Low-Impact Practices: Low-impact methods were highly regarded for their dual economic and environmental benefits. Controlled blasting (Mean = 4.2) and mechanized excavation (Mean = 4.1) were identified as critical for reducing land degradation and soil disturbance. Efficient water management systems (Mean = 4.1) and the use of biodegradable chemicals (Mean = 4.0) were also recognized for minimizing water contamination and lowering long-term operational costs.

Challenges to Adoption: Despite recognized benefits, adoption is bottlenecked by six primary challenges: Financial constraints (75%), limited technical capacity (72%), regulatory barriers (70%), restricted access to modern technology (68%), institutional support gaps (65%), and high operational costs (63%). KIIs revealed that regulatory inconsistencies and a lack of government-backed financial schemes deter mining operators especially small-scale and artisanal miners from making the high initial capital investments required for sustainable technologies.

4. CONCLUSION AND RECOMMENDATIONS

Emerging technologies and low-impact practices possess demonstrable potential to transform Tanzania's mining sector into a more efficient, safe, and environmentally sustainable industry. However, the transition from conventional to sustainable mining cannot rely on technological solutions alone; it requires an enabling ecosystem. The study recommends that policymakers and industry actors establish targeted financial subsidies and credit facilities for green mining technologies. Furthermore, regulatory frameworks must be stabilized and strictly enforced to incentivize long-term sustainable investments. Finally, institutionalizing technical capacity-building and training programs is critical to equipping the local workforce to operate and maintain advanced mining technologies.

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TOPIC

Workforce Alignment and Health Service Delivery in Selected Districts of Central Uganda

Keywords: Workforce Alignment, Human Resource Planning, Health Service Delivery, Public Health Facilities, Central Uganda.

AUTHORS

Peter Kaddu

Background and Problem Statement

Globally, human resources are recognized as strategic assets critical to organizational effectiveness and health service delivery. The Resource-Based View (RBV) theory posits that organizations achieve superior performance when valuable workforce capabilities are effectively deployed and utilized. In Sub-Saharan Africa, however, health systems are plagued by workforce shortages, skills mismatches, and inequitable distribution of personnel, constraining the delivery of quality services. In Uganda, despite the Ministry of Health's emphasis on strategic workforce planning, persistent challenges such as uneven geographical distribution, inadequate deployment practices, and competency mismatches continue to affect healthcare performance. These disparities often result in increased workloads, prolonged waiting times, and reduced patient satisfaction. While previous studies have examined broader human resource planning practices, limited empirical attention has focused specifically on the impact of workforce alignment the matching of employee competencies with organizational needs within the context of Ugandan public health facilities.

Objective

This study aimed to examine the influence of workforce alignment on perceived health service delivery in selected districts of Central Uganda.

Methodology

The study adopted a convergent mixed-methods design, incorporating both quantitative and qualitative approaches. A cross-sectional survey was conducted involving 158 health personnel selected from public health facilities in the districts of Luwero, Nakaseke, and Nakasongola. Ultimately, 150 respondents completed the quantitative questionnaires. Additionally, 33 qualitative participants including HR officers, health officials, patients, and community memberswere selected purposively for Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs). Data collection instruments included structured questionnaires and interview guides. Validity was established through expert judgment (Content Validity Index > 0.70), and reliability was confirmed using Cronbach's Alpha coefficients (> 0.70). Quantitative data were analyzed using SPSS Version 29, employing descriptive statistics, Pearson correlation, and regression analysis. Qualitative data were analyzed thematically.

Results

Descriptive statistics indicated a high level of workforce alignment (Mean = 4.107, SD = 1.069) and a very high level of perceived health service delivery (Mean = 4.777, SD = 0.419). Pearson correlation analysis revealed a statistically significant moderate positive relationship between workforce alignment and perceived health service delivery ($r = .490$, $p < .001$). Regression analysis further established that workforce alignment is a significant predictor of health service delivery ($\beta = .490$, $p < .001$), accounting for 24% of the variance in service delivery outcomes ($R^2 = .240$).

Qualitative findings corroborated these statistical results, revealing that appropriate role allocation, competency-based deployment, effective communication, staff motivation, and continuous performance monitoring enhanced service efficiency, quality, and continuity of care. Respondents noted that assigning the right staff to positions matching their training minimized confusion and improved accountability. However, the study also identified barriers to effective alignment, including staffing shortages, high turnover, inadequate infrastructure, and limited training resources.

Discussion and Conclusion

The findings support the Resource-Based View theory, demonstrating that the strategic alignment of employee competencies with organizational requirements significantly enhances operational efficiency and patient outcomes. The rejection of the null hypothesis confirms that workforce alignment is a critical determinant of perceived health service delivery in resource-constrained settings. While the study acknowledges that workforce alignment explains 24% of the variance in service delivery implying other systemic factors play a role it establishes alignment as a vital mechanism for optimizing the limited human resources available.

Recommendations

Based on these findings, the study recommends that public health facilities and the Ministry of Health adopt competency-based deployment frameworks to ensure staff roles match their professional skills. Regular workforce assessments should be conducted to address skill mismatches and distribution imbalances. Furthermore, strengthening performance management systems and providing continuous professional development are essential to maintain staff motivation and improve health service delivery outcomes in Uganda.

TOPIC

Social-Equity-Oriented Participation Mechanisms in Large-Scale Agricultural Investments for Lwera Wetland Communities, Kalungu District, Uganda: A Literature Synthesis

Keywords: Social Equity, Participation Mechanisms, Large-scale Agricultural Investments (LAIs), Lwera Wetlands, FPIC, Stakeholder Support, Uganda.

AUTHORS

Peter Kibuuka

ABSTRACT

Large-scale agricultural investments (LAIs) in ecologically sensitive zones like the Lwera Wetlands in Uganda often marginalize local communities, leading to livelihood losses and conflicts. This literature synthesis examines the pathways through which community participation mechanisms can foster social equity in such investments. Grounded in People-Centered Development Theory (PCDT) and Social Equity Theory, the study conceptualizes a progressive pathway from information dissemination to consultation, collaboration, and stakeholder support. The synthesis reveals that while Free Prior Informed Consent (FPIC) reduces knowledge asymmetries, its effectiveness is hindered by gender and literacy barriers. Furthermore, consultation and collaboration only yield equitable outcomes when they transcend tokenism to facilitate genuine power-sharing and joint decision-making, supported by well-resourced state and non-state actors. To address empirical gaps in LAI-wetland scholarship, the study advances four testable hypotheses for mixed-methods research. The paper concludes by recommending the institutionalization of an "information → consultation → collaboration → equity" pathway to ensure commercial rice farming in Lwera aligns with community well-being and distributive justice.

1. INTRODUCTION

Since 2008, large-scale agricultural investments (LAIs) have expanded across sub-Saharan Africa, driven by the promise of economic growth and food security. In Uganda's Lwera Wetlands (Kalungu District), commercial rice farming projects have enclosed over 2,000 hectares since 2018. However, these investments have generated severe ecological and social trade-offs. The wetlands traditionally support over 100,000 people through fishing, papyrus harvesting, and seasonal farming. The enclosures have led to a 65% drop in fish catches, loss of women's processing incomes, and a 40% increase in youth out-migration.

The core problem is weak community participation. Top-down approaches limit local voice, resulting in inequitable benefit distribution where communities contribute land and labor but receive minimal returns. This literature synthesis explores four interconnected participation mechanisms information dissemination, consultation, collaboration, and stakeholder support as pathways to achieve social equity in the Lwera wetland context.

2. THEORETICAL FOUNDATIONS

The synthesis is anchored in two theories. People-Centered Development Theory (PCDT) (Korten, 1984) challenges top-down planning, arguing that communities must define their own goals and manage resources. It aligns with Arnstein's (1969) ladder of participation, which spans from passive information receipt to active citizen control.

Social Equity Theory (Adams, 1963; Frederickson, 2020) provides the lens for assessing fairness. It posits that communities evaluate fairness by balancing their inputs (land, local knowledge) against outputs (infrastructure, jobs, compensation). The theory distinguishes between procedural justice (fair processes) and distributive justice (fair outcomes), providing a framework to evaluate whether LAIs in Lwera are socially just.

3. SYNTHESIS OF PARTICIPATION MECHANISMS

The literature identifies a sequential pathway where each mechanism builds upon the previous one to achieve equity:

Information Dissemination: Effective FPIC is the foundational equity tool. Transparent, multichannel communication in local languages reduces knowledge asymmetries, enabling communities to negotiate better terms (German et al., 2022). However, structural barriers often exclude women and low-literacy households.

Consultation: Moving beyond performative rituals, meaningful consultation requires structured, inclusive dialogues that translate community voices into real influence (Jones et al., 2019). In Lwera, consultations must actively include youth and women to reduce anxiety and build trust in land-use decisions.

Collaboration: True equity requires power-sharing through institutionalized joint committees and written agreements (Welsh & McGraw, 2025). Community-led mapping of customary fishing grounds and papyrus zones is vital to prevent elite capture and protect livelihood spaces (Okoth & Ochieng, 2022).

Stakeholder Support: Government agencies, CSOs, and customary leaders act as the backbone of this pathway. Where civic space is protected and wetland officers are resourced, participation is meaningful; where they are weak, participation becomes symbolic (CIVICUS, 2020; Kugonza & Nakayi, 2023).

4. RESEARCH GAPS AND PROPOSED METHODOLOGY

Existing literature relies heavily on small qualitative case studies lacking statistical generalizability. There is a distinct gap in testing the sequential "information → consultation → collaboration → equity" pathway quantitatively, and in analyzing how gender, age, and tenure moderate these relationships.

To address this, the broader research proposes a parallel convergent mixed-methods design. This includes household surveys (n=219) across five wetland parishes utilizing Structural Equation Modeling (SEM) to test four hypotheses:

H1: Higher information dissemination correlates with reduced displacement conflicts.

H2: Effective consultation enhances livelihood resilience.

H3: Collaboration predicts power balance.

H4: Stakeholder support yields sustainable equity gains.

These will be integrated with qualitative data from Focus Group Discussions and Key Informant Interviews.

5. CONCLUSION AND POLICY RECOMMENDATIONS

The dominance of rice LAIs in the Lwera wetlands currently exemplifies Social Equity Theory's warning: community losses are vastly outstripping gains. Achieving equitable outcomes requires shifting from tokenistic engagement to structured power-sharing.

The study recommends that policymakers in Kalungu District: (1) Enforce mandatory, multichannel FPIC targeted at marginalized groups; (2) Formalize gender-balanced company-community committees with legally binding benefit-sharing agreements; (3) Integrate community-led land-use maps into district physical plans; and (4) Protect civic space and resource district wetland officers to ensure oversight. By institutionalizing this sequential participation framework, LAIs can transition from being sources of displacement to drivers of community-grounded development.

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TOPIC

Assessment of Facilitators' Strategies for Managing Artificial Intelligence Challenges in Higher Education Assessment and Evaluation in Tanzania

Keywords: Artificial Intelligence, Higher Education, Assessment, Academic Integrity, Tanzania, Technology Acceptance Model, Constructivist Theory.

AUTHORS

Willy Maliganya & Marietha Alexander Mboshaa

ABSTRACT

The integration of Artificial Intelligence (AI) in higher education has created a dual-edged sword: enhancing assessment efficiency while simultaneously threatening academic integrity. In Tanzania, while national policies recognize the importance of ICT in education, specific guidelines for AI integration in assessment are absent. This study explores how facilitators in Tanzanian higher learning institutions cope with AI-induced challenges during assessment. Grounded in Constructivist Learning Theory and the Technology Acceptance Model (TAM), the study employed a qualitative multiple-case study design. Data were collected through semi-structured interviews with 12 purposively sampled facilitators from four universities and supplemented by a documentary review of national education and ICT policies. Findings reveal a significant policy vacuum, forcing facilitators to rely on personal judgment and ad-hoc measures. To mitigate AI misuse, facilitators utilize plagiarism detection tools (100%), assessment redesign focusing on higher-order thinking (83%), modified timed formats (75%), institutional codes (58%), and peer support (50%). While facilitators acknowledge AI's efficiency, 100% expressed concerns over academic integrity risks. The study concludes that without explicit national and institutional AI policies, assessment integrity remains fragmented. It recommends urgent policy formulation, targeted capacity building, and infrastructural investment to ensure ethical AI integration.

1. INTRODUCTION

Artificial Intelligence (AI) is fundamentally transforming educational assessment globally. Technologies such as automated grading, adaptive testing, and generative AI (like ChatGPT) offer unprecedented scalability and efficiency. However, they also introduce severe ethical and pedagogical challenges, notably the threat to the authenticity and originality of student work. While high-resource settings are piloting AI-resilient assessments, Sub-Saharan Africa faces a unique paradox: leveraging AI for educational modernization while grappling with systemic digital infrastructure deficits and unbalanced access.

In Tanzania, national frameworks including the Tanzania Development Vision 2025, the Education and Training Policy (2014), and the National ICT Policy (2016) actively advocate for ICT integration. However, a critical gap exists: these documents lack specific operational guidelines for AI in educational assessment. Consequently, facilitators are left in a regulatory vacuum, forced to interpret ICT guidelines independently. This study investigates how Tanzanian higher education facilitators navigate this vacuum,

identifying the strategies they employ to mitigate AI-related assessment risks and evaluating the adequacy of existing policy frameworks.

2. THEORETICAL FRAMEWORK

The study is anchored in two complementary theories. Constructivist Learning Theory (Piaget & Vygotsky) posits that learners actively construct knowledge. In the context of AI, constructivism justifies the shift from rote-memorization assessments (easily replicated by AI) to process-oriented, higher-order tasks (e.g., oral defenses, iterative projects) that require contextual human cognition.

Conversely, the Technology Acceptance Model (TAM) (Davis, 1989) explains facilitators' behavioral intentions toward adopting AI-detection tools or digital assessment platforms. TAM highlights that facilitators' reliance on technical tools is predicated on "perceived usefulness" and "perceived ease of use," which are heavily influenced by the resource-constrained environments typical of many Tanzanian institutions.

3. METHODOLOGY

The study adopted a qualitative approach utilizing a multiple-case study research design to capture in-depth, context-specific experiences. Participants comprised 12 facilitators purposively selected from four higher learning institutions: Sokoine University of Agriculture (SUA), Mwalimu Nyerere Memorial Academy (MNMA), Institute of Accountancy Arusha (IAA), and the University of Dar es Salaam (UDSM). Selection criteria included active involvement in assessment and prior exposure to technology-enhanced learning.

Data were collected via in-depth semi-structured interviews (45–60 minutes each) and a documentary review of national policies. Data were analyzed using thematic content analysis, involving verbatim transcription, coding, and categorization into themes. Trustworthiness was ensured through methodological triangulation (interviews vs. documents) and member-checking.

4. RESULTS AND DISCUSSION

4.1 The Policy Vacuum

Documentary analysis revealed that while Tanzanian policies emphasize digital literacy and e-learning, they are completely silent on the ethical, operational, and regulatory specifics of AI in assessment. This absence forces institutions to rely on broad, pre-AI academic integrity codes (e.g., generic plagiarism rules). Facilitators reported that this ambiguity leads to inconsistent enforcement across departments and institutions, leaving them stressed and relying heavily on personal discretion when encountering AI-generated content.

4.2 Facilitators' Mitigation Strategies

Despite the policy gaps, facilitators employ a spectrum of technical, pedagogical, and regulatory strategies:

Plagiarism Detection Software (100%): Universally adopted (e.g., Turnitin) as the first line of defense to identify AI footprints, though facilitators noted sophisticated AI can sometimes bypass these tools.

Assessment Redesign (83%): Shifting from take-home essays to project-based assessments, case studies, and oral defenses. Facilitators noted that iterative processes (draft → feedback → defense) effectively expose AI-generated inconsistencies.

Modified Assessment Formats (75%): Reverting to timed, in-class assessments and incremental submissions to minimize the opportunity for students to use generative AI.

Institutional Guidelines (58%): Utilizing existing codes of conduct, though facilitators noted these are inadequate for nuanced AI disputes.

Capacity Building & Peer Support (50%): Informal departmental workshops to share AI-detection tactics and redesign assessment rubrics.

4.3 Facilitators' Perceptions

Facilitators exhibited a paradoxical relationship with AI. While 67% acknowledged that AI significantly improves grading speed and objectivity in large classes, a universal 100% expressed grave concerns regarding academic integrity. Furthermore, 75% strongly emphasized the urgent need for institutional direction. As one senior lecturer noted, without clear guidelines, deciding whether to penalize or guide a student using AI becomes a highly subjective and stressful process.

5. CONCLUSION AND RECOMMENDATIONS

Facilitators in Tanzanian higher education are currently the frontline defense against AI-enabled academic misconduct, utilizing ad-hoc strategies to protect assessment integrity. However, individual resilience cannot substitute for systemic governance. The reliance on personal judgment creates inequities and inconsistencies in the quality assurance of higher education.

To address this, the study recommends:

Policy Reform: The Ministry of Education and ICT authorities must urgently update national policies to include explicit definitions, acceptable uses, and enforcement protocols for AI in assessments.

Capacity Building: Institutions must institutionalize continuous professional development (CPD) to train facilitators in AI-resistant pedagogical designs and advanced detection techniques.

Infrastructure Investment: Universities need to invest in secure learning management systems (LMS), AI-integrated proctoring tools, and robust plagiarism detection software.

Collaborative Networks: Foster formal inter-departmental and inter-institutional forums for facilitators to share evolving best practices regarding AI mitigation.

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TOPIC

Meta-Analysis of Arrivalism at the Crossroad with Progressivism: A Preferential Equilbrium Progressivism Model a Case of Uganda

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Abstract

In the Ugandan context, **"Arrivalism"** is a socio-political and economic term used to describe the mindset of complacency, entitlement, or premature satisfaction that sets in once a person or politician attains a certain level of wealth, power, or social status (Chimp Corps, 2021). Ugandan corporates, the elites, and other chaps that belong in the arrivalism club have a habit of dodging their civic duties. They have all kinds of excuses for dodging the black tax. Today, we shall take time to educate these ungrateful chaps about the greatness of the black tax system, how it works and why they ought to be compliant Ortegalan (2022).

Sociological and Literary "Arrivalism" (Postponed Arrival)

In 21st-century academic and literary terms, **arrivalism** describes the condition of being in a constant state of "arriving" without ever fully "arriving".

Behavioral/Cultural "Arrivalism" (Success Entitlement)

In a modern African context, particularly in Uganda, "arrivalism" is described as a social disease or a mindset of entitlement, often affecting upwardly mobile individuals. here are several symptoms of behavour that include victims exhibiting intense jealousy, unnecessary competition at workplaces or homes, and a sense of self-entitlement.In some African contexts, it is linked to the pressure of having "arrived" (built a house, achieved status), which creates "dead capital" as people build huge houses for prestige that offer no economic return.

Economic arrivalism: The "1234" Economic Syndrome Among the Ugandan middle class, arrivalism often takes the form of ceasing to strive for financial growth or continuous innovation once they acquire the "1234": **1** wife (or spouse), **2** children, a **3**-bedroom house, and a **4**-wheel-drive car. It reflects an attitude of "I have arrived," which stifles further ambition' (Chimp Corps, 2021)

Political arrivalism; Political and Elite Complacency

President Yoweri Museveni has frequently criticized this syndrome among students, civil servants, and graduates, noting that "arrivalism" prevents people from continually learning and adapting to new skills. In the political sphere, it is often tied to a "get rich quick" mentality. Politicians and government officials may exhibit exaggerated displays of authority and wealth—such as driving in disruptive convoys or blocking roads—living beyond their official means (Chimp Corps, 2021)

Cultural arrivalism: "Dead Capital" in Rural Areas

Culturally, it is heavily associated with building massive, economically unviable retirement homes in rural or ancestral villages. A Ugandan man is traditionally expected to build a substantial homestead to prove he has "made it," resulting in sprawling but underutilized estates that lock up capital (Monitor, 2021)

Civic Apathy and the "Black Tax"

Ugandan elites afflicted by arrivalism often attempt to distance themselves from their socio-economic origins. They have a reputation for avoiding their civic duties and dodging the cultural "black tax" (financial obligations to support extended family), failing to lift up their local communities (Ortega, 2022)

Sociologists and political commentators in the country highlight arrivalism as a core obstacle to Uganda's long-term economic development. Because the elite "arrive" prematurely, they frequently stop investing, mentoring, or striving for excellence, leading to widespread mediocrity, stagnant family wealth, and persistent poverty at the grassroots level (Monitor, 2021)

This study developed a Preferential Equilibrium Progressivism (PEP) model that would be used to harmonize arrivalism and entitlement across all dimensions human eco-existence.

In conclusion, the crossroad exists between upholding high universal standards of social justice and welfare (progressive goals) while managing the diverse, high-volume arrival of newcomers (arrivalism). The challenge lies in creating a "Progressive Nationalism" or similar framework that balances inclusion with structural sustainability

TOPIC

Artificial Intelligence-Driven Cybersecurity for Critical Infrastructure Protection: A Pathway to Sustainable Development

Keywords: Artificial Intelligence (AI); Cybersecurity; Critical Infrastructure Protection; Cyber Resilience; Sustainable Development

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Abstract

The increasing digitalization of critical infrastructure sectors such as energy, healthcare, transportation, finance, and industrial systems has significantly expanded their exposure to cyber threats. Traditional cybersecurity approaches are increasingly challenged by sophisticated attacks that exploit interconnected digital environments. This study examines the role of Artificial Intelligence (AI)-driven cybersecurity in protecting critical infrastructure and supporting sustainable development. Using a systematic qualitative literature review, the study synthesizes evidence from peer-reviewed research published between 2018 and 2025 on AI applications in cybersecurity, cyber resilience, and critical infrastructure protection.

The findings indicate that AI technologies, particularly Machine Learning (ML) and Deep Learning (DL), significantly improve threat detection accuracy, reduce incident response times, and enable predictive security capabilities. AI-driven solutions have demonstrated effectiveness across multiple critical infrastructure sectors by supporting real-time anomaly detection, automated response mechanisms, and proactive threat mitigation. These capabilities strengthen cyber resilience and contribute to sustainable development objectives through enhanced infrastructure reliability, secure digital services, and institutional stability.

However, the study identifies several challenges, including adversarial attacks against AI systems, data quality limitations, lack of explainability, skills shortages, and inadequate regulatory frameworks. The research argues that the successful adoption of AI-driven cybersecurity requires trustworthy, explainable, and well-governed systems supported by appropriate policies, ethical frameworks, and capacity-building initiatives. The study concludes that AI-driven cybersecurity represents a critical pathway for safeguarding critical infrastructure and advancing sustainable development, provided that implementation balances technological innovation with transparency, accountability, and human oversight.

1. Introduction

Critical infrastructure forms the backbone of modern societies by supporting essential services such as energy generation, transportation, healthcare, financial systems, and communications. Increasing digitalization through technologies such as the Internet of Things (IoT), cloud computing, and big data analytics has improved operational efficiency while simultaneously expanding the cyber threat landscape (Saeed et al., 2023; Salem et al., 2024).

Traditional cybersecurity mechanisms based on signatures and predefined rules are increasingly insufficient against sophisticated and rapidly evolving threats. Consequently, Artificial Intelligence (AI)

has become a critical enabler of modern cybersecurity by providing capabilities for automated threat detection, anomaly identification, and adaptive response (Kaur et al., 2023; Dhanushkodi & Thejas, 2024). Beyond security benefits, AI-driven cybersecurity contributes to sustainable development by supporting resilient infrastructure, secure digital services, and institutional trust, which are central to Sustainable Development Goals (SDGs), particularly SDG 9- Industry, Innovation and Infrastructure, SDG 11- Sustainable Cities and Communities, and SDG 16- Peace, Justice and Strong Institutions (Filho et al., 2022). This study explores how AI-driven cybersecurity enhances critical infrastructure protection and examines its implications for sustainable development.

1. Literature Review

Existing research demonstrates that digital transformation has increased the vulnerability of critical infrastructure to cyber threats due to greater connectivity and interdependence among systems (Saeed et al., 2023; Zhang et al., 2022). Cyber Threat Intelligence (CTI) frameworks have emerged as important tools for identifying vulnerabilities and strengthening organizational resilience (Sun et al., 2023).

Artificial Intelligence technologies, particularly Machine Learning and Deep Learning, are increasingly applied to cybersecurity functions including intrusion detection, malware classification, anomaly detection, spam filtering, and threat prediction (Kaur et al., 2023; Salem et al., 2024). Studies consistently report improved detection accuracy, faster response times, and reduced false-positive rates compared to conventional approaches (Wiafe et al., 2020; Dhanushkodi & Thejas, 2024).

Within critical infrastructure environments, AI applications support real-time monitoring, predictive maintenance, automated defense mechanisms, and anomaly detection in sectors such as energy, healthcare, transportation, and industrial control systems (Gill et al., 2024; Rjoub et al., 2023). However, concerns regarding explainability, transparency, adversarial attacks, and governance continue to challenge widespread adoption (Zhang et al., 2022; Hassija et al., 2023).).

1. Methodology

This study employed a qualitative research design using a systematic literature review approach. Scholarly publications were obtained from major databases, including IEEE Xplore, ACM Digital Library, Scopus, and Web of Science. Inclusion criteria focused on peer-reviewed studies published between 2018 and 2025 that examined AI applications in cybersecurity, cyber resilience, and critical infrastructure protection.

The selected literature was analyzed using thematic coding. Four major themes guided the analysis: critical infrastructure and cyber threats, AI in cybersecurity, AI for critical infrastructure protection, and AI-driven cyber resilience for sustainable development. The approach enabled a comprehensive synthesis of current knowledge, emerging trends, and research gaps.

1. Findings/Results and Discussion

The review demonstrates that AI-driven cybersecurity significantly strengthens critical infrastructure protection. Machine Learning-based intrusion detection systems and anomaly detection models have achieved detection accuracy levels ranging between 94% and 99%, substantially outperforming many traditional security approaches (Ozkan-Okay et al., 2024; Gujar, 2024). Similar studies report threat detection rates approaching 98% in critical energy infrastructure environments (Govea et al., 2024).

AI also contributes to faster and more autonomous incident response. Research indicates that AI-driven security systems can reduce response times by more than 70%, enabling rapid containment and mitigation of cyber incidents (Govea et al., 2024). Autonomous AI frameworks further reduce dependence on human intervention and improve operational efficiency in critical sectors (Paulraj et al., 2025).

Another significant contribution of AI lies in predictive cybersecurity capabilities. By analyzing behavioral patterns and threat intelligence data, AI systems can identify emerging threats, anticipate vulnerabilities, and support proactive risk management strategies (Kaur et al., 2023; Achuthan et al., 2024). These capabilities strengthen organizational and national cyber resilience by shifting cybersecurity from a reactive to a predictive model.

The findings also reveal strong alignment between AI-driven cybersecurity and sustainable development. Resilient digital infrastructure supports economic growth, public safety, and institutional

stability, thereby contributing directly to SDGs 9, 11, and 16 (Filho et al., 2022; Gill et al., 2024). Secure infrastructure ensures continuity of essential services and enhances societal resilience against cyber disruptions.

Despite these benefits, several challenges persist. AI systems remain vulnerable to adversarial attacks, data poisoning, and model manipulation (Rahman et al., 2025). Furthermore, the "black-box" nature of many AI models raises concerns regarding accountability, transparency, and regulatory compliance (Rjoub et al., 2023; Zhang et al., 2022). Resource limitations, skills shortages, and inadequate governance frameworks further hinder adoption, particularly in developing countries.

These findings suggest that AI-driven cybersecurity should be implemented alongside explainable AI mechanisms, robust governance structures, and continuous capacity-building initiatives to maximize resilience and sustainability outcomes.

1. Conclusion and Recommendations

AI-driven cybersecurity represents a transformative approach to protecting critical infrastructure in an increasingly interconnected digital environment. Evidence from the reviewed literature demonstrates that AI enhances threat detection, accelerates incident response, improves predictive security capabilities, and strengthens cyber resilience across multiple sectors.

These benefits contribute directly to sustainable development through resilient infrastructure, secure digital transformation, and enhanced institutional stability. However, realizing these benefits requires addressing challenges related to explainability, trust, adversarial resilience, governance, and workforce development.

The study recommends the adoption of trustworthy and explainable AI models, strengthened data governance practices, investment in cybersecurity and AI capacity building, development of sector-specific regulatory frameworks, and deployment of hybrid AI-human security architectures. Such measures will help ensure that AI-driven cybersecurity effectively safeguards critical infrastructure while advancing sustainable development objectives.

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TOPIC

Artificial Intelligence-Driven Cybersecurity for Critical Infrastructure Protection: A Pathway to Sustainable Development

Keywords: Human-Centered AI, Ethical AI, Frugal Innovation, Sovereign AI, Africa,

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Abstract

Artificial Intelligence (AI) is increasingly deployed at a societal scale, mediating healthcare, agriculture, education, and public services. Yet without ethical safeguards and human-centered design, such systems risk amplifying inequities and eroding trust. This paper introduces the Frugal and Sovereign Human-Centered AI (FS-HCAI) framework, which integrates five pillars of frugality, sovereignty, inclusivity, transparency, and ethical alignment, to guide the responsible evolution of agentic AI. Drawing on case studies from Uganda and Rwanda, we demonstrate how FS-HCAI principles translate into measurable public benefit, from Uganda's national ethical AI framework for public trust to Rwanda's drone-enabled medical logistics that reduce delivery times and save lives in remote communities. The framework emphasizes participatory design, local data stewardship, and contextual ethics as actionable constraints for building resilient, trusted, and socially embedded AI systems. We further discuss challenges in scaling participatory methods, institutionalizing ethical oversight, and reconciling global frameworks with local epistemologies. Our recommendations highlight pathways for policy, design, research, and capacity building to operationalize FS-HCAI at scale. We argue that ethical and human-centered AI is not a luxury but a necessity for societal-scale deployment, particularly in Africa, and that FS-HCAI offers a blueprint for building AI systems that are not only intelligent, but also just, inclusive, and sovereign.

TOPIC

E-Government Adoption for Sustainable Public Service Delivery in Uganda: A Quantitative Analysis of the National Planning Authority and the Judiciary Using UTAUT

Keywords: e-government, adoption, UTAUT, behavioral intention, usage behavior, public sector, Uganda, ECCMIS

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ABSTRACT

As governments worldwide transition to digital platforms to enhance efficiency and transparency, Uganda has introduced several e-government systems, including the Judiciary's Electronic Case and Court Management Information System (ECCMIS) and the National Planning Authority's (NPA) National Development Plan (NDP) Monitoring and Evaluation system. However, the implementation of these systems often faces challenges related to user adoption. This study examines the determinants of e-government adoption for improved public service delivery in Uganda's public sector, focusing on the Judiciary and NPA. Using the Unified Theory of Acceptance and Use of Technology (UTAUT) and a quantitative research design, data were collected from 51 senior administrative staff and technical officers via a structured questionnaire. Simple and multiple linear regression analyses were conducted to assess the influence of performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC) on behavioral intention (BI) and actual usage behavior (UB). Results indicate that while perceived usefulness and social support drive behavioral intention, it is the enabling conditions that drive actual usage. Specifically, PE ($\beta=0.52, p<0.001$) and SI ($\beta=0.31, p=0.002$) significantly predicted BI, explaining 98.9% of the variance. However, PE alone did not significantly predict UB ($\beta=-0.19, p>0.05$). In contrast, facilitating conditions (FC) had a significant direct influence on UB ($\beta=0.39, p=0.001$). The study underscores that digital systems are critical for achieving SDGs 16, 9, and 17, but adoption requires not just social endorsement, but robust technical infrastructure and support.

1. INTRODUCTION

E-government continues to transform how governments operate, offering innovative solutions that reduce bureaucracy and accelerate service delivery. In Uganda, initiatives such as the Judiciary's Electronic Case and Court Management Information System (ECCMIS) and the NPA's NDP Monitoring and Evaluation system aim to enhance case management and track national development progress. Despite these advancements, the mere presence of digital platforms does not guarantee utilization. User adoption is often hindered by perceptions of system utility, ease of use, social pressure, and the availability of necessary resources.

Understanding the behavioral determinants of adoption is crucial for Uganda to realize a return on its digital investments and achieve sustainable development goals. This study utilizes the Unified Theory of

Acceptance and Use of Technology (UTAUT) to analyze the drivers of adoption within two key Ugandan institutions. The UTAUT model posits that performance expectancy, effort expectancy, and social influence shape behavioral intention, which, alongside facilitating conditions, determines actual usage behavior (Venkatesh et al., 2003). This research seeks to bridge the gap between technological deployment and actual usage by empirically validating these constructs in the context of Uganda's public sector.

2. OBJECTIVES

Guided by the UTAUT framework, the study aimed to: Examine the determinants of behavioral intention (BI) to use digital government systems, Assess the effect of behavioral intention (BI) on actual use behavior (UB), and Evaluate the influence of facilitating conditions (FC) on actual use behavior (UB).

3. METHODOLOGY

The study employed a cross-sectional survey design targeting senior administrative staff and technical officers at the Judiciary and NPA. Stratified random sampling was used to select 51 respondents. Data were collected using a structured questionnaire measuring Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), Behavioral Intention (BI), and Usage Behavior (UB). Reliability was confirmed using Cronbach's alpha (all constructs > 0.68). Data analysis involved descriptive statistics, Pearson correlation, and multiple linear regression to test the hypothesized relationships.

4. RESULTS AND DISCUSSION

4.1 Determinants of Behavioral Intention (BI)

The study found that behavioral intention is significantly influenced by Performance Expectancy and Social Influence.

Performance Expectancy (PE): Showed a strong positive relationship with intention ($\beta=0.52, p<0.001$). Users who perceived the systems as enhancing job performance were more likely to intend to use them.

Social Influence (SI): Also significantly predicted intention ($\beta=0.31, p=0.002$), highlighting the role of peer and leadership pressure in the public sector.

Effort Expectancy (EE): Was not a significant predictor of BI ($\beta=0.14, p>0.05$), suggesting that in this context, perceived ease of use is less critical than perceived utility.

The regression model for BI explained 98.9% of the variance ($R^2=0.989$).

4.2 Determinants of Usage Behavior (UB)

Contrary to the prediction that perceived usefulness would drive actual use, the study found a gap between intention and action.

Performance Expectancy (PE): Did not significantly predict Usage Behavior ($\beta=-0.19, p=0.793$; $R^2=0.027$). This suggests that simply believing a system is useful does not translate to usage if other factors are absent.

Facilitating Conditions (FC): Emerged as the strongest predictor of actual usage ($\beta=0.39, p=0.001$). The availability of infrastructure, technical support, and resources was essential for translating intention into behavior.

5. CONCLUSION

The study demonstrates that while social influence and performance expectancy drive the intention to adopt e-government systems in Uganda, actual usage is heavily dependent on facilitating conditions. This highlights a critical "intention-behavior gap" within the Ugandan public sector. Policymakers must therefore move beyond promoting the benefits of digital systems to ensuring that the technical infrastructure, reliable internet, and organizational support are in place. Addressing these facilitating conditions is paramount for sustainable public service delivery and the realization of SDGs 16, 9, and 17.

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TOPIC

Technological Adaptability and Health Service Quality in Ugandan Hospitals: A Systematic Review

Keywords: Technological Adaptability, Health Service Quality, Digital Health, Healthcare Systems

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Abstract

The integration of digital health technologies is increasingly recognized as a critical factor in improving healthcare delivery, particularly in low and middle income countries. In Uganda, hospitals are progressively adopting technologies such as electronic medical records, telemedicine, and digital diagnostic systems; however, variability in technological adaptability remains a key challenge affecting service quality. This systematic review examines the role of technological adaptability as a driver of health service quality in Ugandan hospitals. A comprehensive search of PubMed, Scopus, and Web of Science identified 1,248 records published between 2010 and 2025, of which 1,032 remained after duplicate removal. Following screening and eligibility assessment, 42 studies were included in the final analysis. The findings indicate that approximately 78% of studies reported improvements in service efficiency, including reduced patient waiting times and streamlined clinical workflows, while 64% demonstrated increased patient satisfaction associated with the adoption of digital health technologies.

Additionally, improvements in diagnostic accuracy and patient safety were frequently reported. Despite these benefits, several barriers to technological adaptability were identified, including limited infrastructure, inadequate staff training, high implementation costs, and resistance to change challenges that are particularly pronounced in resource constrained hospital settings in Uganda. Evidence further suggests that hospitals investing in staff capacity building and supportive institutional policies experience greater gains in service quality. In conclusion, technological adaptability is a significant determinant of health service quality in Ugandan hospitals. Strengthening digital infrastructure, enhancing workforce competencies, and promoting context-specific implementation strategies are essential for maximizing the impact of healthcare technologies. These findings provide valuable insights for healthcare administrators, policymakers, and practitioners seeking to improve healthcare service delivery across Uganda.

TOPIC

Audit Committee Attributes and Loan Portfolio Performance of Saccos in Bushenyi District, Uganda

MPANGA LIBRARY

Keywords: e-government, adoption, UTAUT, behavioral intention, usage behavior, public sector, Uganda, ECCMIS

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1. Introduction

Savings and Credit Cooperative Organizations (SACCOs) are pivotal in driving financial inclusion, poverty reduction, and socio-economic transformation in Uganda by serving populations excluded from formal banking systems. However, despite their critical role, the Ugandan SACCO sector is plagued by severe governance and loan management challenges. Recent reports from the Office of the Auditor General (2024) and the Uganda Microfinance Regulatory Authority (UMRA) indicate that non-performing loans (NPLs) in government-supported lending portfolios stand at a staggering 66.4%, while impaired loans have consistently remained above 50% over four years.

Following the enactment of the Tier 4 Microfinance Institutions and Money Lenders Act (2016), UMRA mandates SACCOs to institute robust internal controls and governance mechanisms, specifically emphasizing audit committees (ACs) to curb escalating NPLs. Yet, an empirical gap persists: while prior studies link AC attributes to general financial performance (e.g., Return on Assets), limited contextualized evidence exists on how specific AC attributes independence, financial expertise, and meeting frequency drive specific loan portfolio performance metrics (Loan Repayment Rate, Portfolio at Risk [PAR], and NPL Ratio) in Uganda. This study addresses this gap by examining SACCOs in Bushenyi District.

2. Theoretical Framework and Objectives

The study is anchored in Agency Theory (Jensen & Meckling, 1976) and Stakeholder Theory (Freeman, 1984). Agency Theory explains how independent and expert ACs mitigate information asymmetry and managerial opportunism in loan dispensation. Stakeholder Theory justifies the need for ACs to safeguard the diverse interests of members, regulators, and depositors through transparent oversight.

Specifically, the study examined the influence of:

Audit committee independence on loan portfolio performance.

Financial expertise on the audit committee on loan portfolio performance.

Frequency of audit committee meetings on loan portfolio performance.

3. Methodology

Adopting a cross-sectional quantitative design, the study collected data from 284 respondents (AC members, managers, accountants, internal auditors, and credit officers) across 36 registered SACCOs in Bushenyi District. To avoid ecological fallacy, individual responses were aggregated to generate a single SACCO-level score (N=36). The instrument demonstrated robust psychometric properties: Kaiser-Meyer-Olkin (KMO) measure was 0.812, Average Variance Extracted (AVE) exceeded 0.50, Composite Reliability (CR) surpassed 0.70, and Cronbach Alpha coefficients ranged from 0.768 to 0.842. Data were analyzed using descriptive statistics, Pearson correlation, and multiple regression analysis, with all regression assumptions (normality, multicollinearity) strictly met.

4. Key Findings

Descriptive results revealed a paradox: SACCOs reported high levels of AC independence (Mean=4.12), financial expertise (Mean=4.28), and meeting frequency (Mean=3.96). However, objective loan portfolio metrics remained poor Loan Repayment Rate was suboptimal at 87.4% (below the 95% benchmark), Portfolio at Risk (PAR) was dangerously high at 12.6% (against a 5% threshold), and the NPL Ratio stood at 9.4%.

Correlation analysis indicated that all three AC attributes had strong, significant positive relationships with Loan Repayment Rate ($p < 0.01$), and strong negative relationships with PAR and NPL Ratio ($p < 0.01$). Financial expertise recorded the strongest correlations.

Multiple regression analysis yielded three significant models:

Loan Repayment Rate: AC attributes explained 62.7% of the variance ($R^2 = 0.627$, $F = 18.274$, $p < 0.001$). Financial expertise was the strongest predictor ($\beta = 0.451$, $p < 0.001$), followed by independence ($\beta = 0.384$) and meeting frequency ($\beta = 0.297$).

Portfolio at Risk: The model explained 59.0% of the variance ($R^2 = 0.590$, $F = 15.341$, $p < 0.001$). Financial expertise exerted the strongest negative influence ($\beta = -0.438$, $p < 0.001$).

NPL Ratio: The model explained 54.9% of the variance ($R^2 = 0.549$, $F = 13.082$, $p = 0.001$). Financial expertise remained the most potent predictor in reducing NPLs ($\beta = -0.421$, $p = 0.001$).

Consequently, all null hypotheses were rejected.

5. Discussion of Findings

The findings validate Agency Theory, demonstrating that independent ACs act as an autonomous defense against management override and conflict of interest in credit allocation, thereby minimizing agency costs. The dominance of financial expertise as the strongest predictor aligns with Stakeholder Theory, confirming that financially competent committee members significantly enhance risk assessment, fraud detection, and loan appraisal quality.

Crucially, the study highlights a nuanced reality: despite high governance scores, portfolio quality remained weak. This suggests that the mere existence of governance structures is insufficient to guarantee financial sustainability. Without complementary factors such as management integrity, robust ICT systems, and strict enforcement of internal controls, ACs cannot single-handedly eliminate loan delinquency.

6. Conclusion and Practical Implications

Effective audit committee attributes particularly financial expertise, independence, and regular meetings significantly influence loan portfolio quality and reduce credit risk exposure in SACCOs. However, they must be integrated into a broader ecosystem of institutional discipline.

Recommendations for Policy and Practice:

For Regulators (UMRA & MTIC): Strictly enforce the Tier 4 Microfinance Institutions and Money Lenders Act (2016) by establishing mandatory minimum financial literacy and independence benchmarks for AC nominees before clearance.

For SACCO Boards: Prioritize the appointment of AC members with demonstrable accounting, finance, and risk management competencies over mere tenure or seniority.

For SACCO Management: Institutionalize regular AC meetings and invest in ICT-driven loan monitoring systems to complement the oversight functions of the AC, thereby bridging the gap between governance structures and actual portfolio performance.

Future Research: Future studies should employ longitudinal and mixed-method designs to examine moderating factors such as management integrity, ICT adoption, and organizational culture on the relationship between AC attributes and loan performance.

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TOPIC

Digital Marketing Strategies and Life Insurance Uptake: A Case of Liberty and Sanlam Life Insurance Companies in Kampala, Uganda

Keywords: Digital Marketing Strategies, Email Marketing, Social Media Marketing, Mobile Marketing, Life Insurance Uptake, Uganda.

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ABSTRACT

Despite the rapid growth of internet connectivity in Sub-Saharan Africa, life insurance penetration in Uganda remains critically low, at less than 1%. As insurance companies pivot from traditional brokerage models to digital platforms, understanding the impact of these technologies on consumer behavior is vital. This study examined the effect of digital marketing strategies specifically email, social media, and mobile marketing on life insurance uptake, focusing on Liberty and Sanlam Life Insurance companies in Kampala. Adopting a mixed-methods case study design, the study collected quantitative data from 88 staff members via self-administered questionnaires and qualitative data from 6 key informants through interviews. Data were analyzed using Pearson correlation and multiple linear regression. Findings revealed that email marketing ($r = 0.532$), social media marketing ($r = 0.622$), and mobile marketing ($r = 0.477$) all have a significant positive relationship with life insurance uptake ($p < 0.05$). Jointly, the three strategies explain 50.2% of the variance in life insurance uptake (Adjusted $R^2 = 0.502$). Notably, social media marketing emerged as the strongest predictor ($\beta = 0.408$), followed by email ($\beta = 0.276$) and mobile marketing ($\beta = 0.248$). The study recommends that insurers adopt behavioral-based email segmentation, tailor content to specific social media platforms, and utilize location-based mobile push notifications to maximize policy uptake and renewals.

1. INTRODUCTION

The evolution of digital technology has fundamentally transformed global marketing paradigms. Digital marketing the use of channels like social media, email, and mobile networks to engage consumers has shifted from a novelty to a core business driver. In Africa, internet penetration surged from 24% in 2015 to approximately 43% in 2023, providing a unique opportunity for businesses to expand their customer bases.

In Uganda, the life insurance sector has historically relied on traditional marketing channels, utilizing tied agents and brokers. However, with the rise of platforms like Facebook, WhatsApp, and Twitter (X), insurers have an unprecedented opportunity to engage customers in real-time. Despite this digital shift, life insurance uptake in Uganda remains abysmally low (less than 1%). While global literature highlights the efficacy of digital marketing, there is a distinct empirical gap regarding how specific digital strategies drive life insurance uptake in the Ugandan context. This study, therefore, investigates the individual and combined effects of email, social media, and mobile marketing on life insurance uptake, using Liberty and Sanlam Life Insurance companies as case studies.

2. METHODOLOGY

The study employed a mixed-methods case study design to ensure triangulation and validity. The target population comprised 150 staff members from the management, marketing, and sales departments of Liberty and Sanlam. Using Slovene's formula, a sample of 110 was targeted, from which 88 questionnaires were successfully returned. Additionally, 6 key informant interviews were conducted with departmental managers.

A self-administered questionnaire measured variables on a 5-point Likert scale. The instrument demonstrated high reliability (Cronbach's alpha = 0.748) and content validity (CVI = 0.897). Quantitative data were analyzed using SPSS version 25, utilizing Pearson correlation to test relationships and multiple linear regression to determine the predictive power of the independent variables. The qualitative data were analyzed thematically to complement the statistical findings.

3. RESULTS AND DISCUSSION

3.1 Correlation and Regression Analysis

Pearson's correlation analysis indicated that all three digital marketing strategies have a statistically significant positive relationship with life insurance uptake. Social media marketing exhibited the strongest correlation ($r = 0.622$, $p < 0.01$), followed by email marketing ($r = 0.532$, $p < 0.01$) and mobile marketing ($r = 0.477$, $p < 0.01$).

The multiple regression analysis yielded a significant model ($F = 30.229$, $p < 0.05$), with an Adjusted R-squared of 0.502. This implies that email, social media, and mobile marketing jointly explain 50.2% of the variations in life insurance uptake at the two companies.

The regression coefficients revealed that:

- Social Media Marketing is the most potent predictor ($\beta = 0.408$, $p = 0.000$).
- Email Marketing is the second strongest predictor ($\beta = 0.276$, $p = 0.002$).
- Mobile Marketing significantly contributes to uptake ($\beta = 0.248$, $p = 0.003$).

3.2 Qualitative Insights

Key informants confirmed that their companies actively utilize Facebook, Twitter (X), and WhatsApp to disseminate product information and engage with customers. Managers noted that digital channels have led to a noticeable increase in policy purchases, premium renewals, and claims processing. However, they conceded that while internal digital uptake is improving, converting the broader Ugandan public remains challenging due to deep-rooted cultural perceptions about insurance.

3.3 Discussion

The dominance of social media marketing aligns with Barrot et al. (2021), who noted that platforms like Facebook and WhatsApp are critical for brand equity and customer engagement. The positive impact of email marketing supports Wreden (2019) and Yan (2020), emphasizing that targeted, trackable emails enhance conversion rates. Furthermore, the significance of mobile marketing corroborates Bakr et al. (2019) and Souiden et al. (2019), who found that personalized mobile campaigns improve perceived value and customer loyalty. The findings suggest that in a market where physical infrastructure is limited, digital channels effectively bridge the gap between insurers and consumers.

4. CONCLUSION AND RECOMMENDATIONS

The study concludes that digital marketing strategies significantly and positively influence life insurance uptake in Uganda. Social media is the most effective tool, likely due to its interactive nature and high penetration among Ugandan demographics. To optimize these digital channels, the study makes the following actionable recommendations:

Email Marketing: Management should move beyond generic blasts and adopt behavioral-based segmentation. Emails should actively solicit feedback and suggestions, transforming passive recipients into active participants.

Social Media Marketing: Insurers must tailor content to specific platforms (e.g., visual success stories for Instagram/Facebook, professional updates for LinkedIn/X). Implementing social listening tools is crucial to monitor feedback and address customer queries promptly.

Mobile Marketing: Companies should design concise, valuable, and even humorous SMS advertisements with clear calls to action. Furthermore, implementing location-based push notifications can trigger alerts when potential clients are in proximity to insurance offices, driving foot traffic and immediate inquiries.

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TOPIC

Unlocking Financial Potential: The Impact of System Accessibility on Sme Performance in Kikuubo Business Centre, Kampala, Uganda

Keywords: System Accessibility, Financial Performance, SMEs, Electronic Tax Systems, Kikuubo, Digital Taxation, Uganda.

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ABSTRACT

Small and Medium Enterprises (SMEs) are the backbone of Uganda's economy, contributing approximately 80% to the national GDP. To enhance tax compliance, the Uganda Revenue Authority (URA) deployed Electronic Tax Systems (ETS). However, in infrastructure-constrained environments, it remains debated whether digital tax accessibility translates into tangible financial benefits for the SMEs themselves. Grounded in the Technology Acceptance Model (TAM) and the Resource-Based View (RBV), this study investigated the impact of ETS system accessibility on the financial performance of SMEs in Kikuubo Business Centre, Kampala.

Employing a mixed-methods research design, the study collected data from 189 respondents including SME owners, URA officials, and tax consultants using structured questionnaires and semi-structured interviews. Quantitative analysis via SPSS revealed that system accessibility is generally high (Composite Mean = 4.13), with system uptime scoring the highest (Mean = 4.35). Furthermore, SMEs reported strong financial performance (Composite Mean = 3.88). Pearson correlation analysis established a strong, positive, and statistically significant relationship between system accessibility and financial performance ($r = 0.711$, $p < 0.01$), confirming that improved digital access enhances profitability, cost efficiency, and revenue growth.

Despite these positive correlations, qualitative insights uncovered a critical usability gap. Findings revealed that 90% of SMEs still face significant technical challenges including interface complexity, slow system responses, and internet outages forcing them to rely on costly third-party tax agents. This reliance inadvertently erodes the net financial gains of digital accessibility. The study concludes that while infrastructural accessibility is a strong predictor of financial performance, it is insufficient on its own. To unlock the full financial potential of digital tax systems, policymakers and the URA must shift their focus from mere system availability to user-centered functionality, targeted digital literacy training, and the stabilization of local digital infrastructure in informal trade hubs.

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TOPIC

Utilization of Corporate Governance in Succession Planning for Sustainable Family-Owned Smes in Uganda's Central Region

Keywords: System Accessibility, Financial Performance, SMEs, Electronic Tax Systems, Kikuubo, Digital Taxation, Uganda.

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1. Introduction

Globally, family-owned businesses (FOBs) are the backbone of economic development, contributing over 75% of global GDP and employment. In Uganda, FOBs dominate the Small and Medium Enterprise (SME) sector, accounting for over 70% of GDP and 80% of employment. Despite this socio-economic dominance, Ugandan FOBs suffer from acute generational fragility, often succumbing to the "three-generation rule" where only 30% survive into the second generation, 12% into the third, and a mere 3% into the fourth. High-profile collapses in Uganda's Central Region, such as Ssembuule Steel Rolling Mills and WBS Television, highlight how weak corporate governance, informal succession practices, and socio-cultural dynamics (e.g., kinship ties and founder reluctance to cede control) precipitate leadership vacuums and business failure. While global frameworks like ESG and the SDGs emphasize corporate governance as a prerequisite for sustainability, there remains a critical empirical gap regarding how governance mechanisms interact with succession planning to secure sustainability in Africa's informal, family-centered business environments.

2. Study Objectives and Theoretical Underpinning

This study investigated the role of corporate governance in strengthening succession planning and promoting the sustainability of family-owned SMEs in Uganda's Central Region. Specifically, the study examined how Human Resource (HR) policies, organizational culture, and employee engagement fortify succession planning to ensure continuity. The research is anchored in the Resource-Based View (RBV) which frames unique governance structures and family cohesion as inimitable competitive advantages and Stewardship Theory which views family members as collective custodians of long-term continuity rather than self-interested agents.

3. Methodology

Employing a mixed-methods cross-sectional design, the study collected quantitative data from 166 respondents across registered family-owned SMEs in Uganda's Central Region, supplemented by qualitative Key Informant Interviews (KIIs) with business owners and managers. Quantitative data were analyzed using Pearson correlation, multiple regression, and Structural Equation Modeling (SEM) to test complex mediated relationships, while qualitative data underwent thematic analysis to provide contextual depth.

4. Key Findings

The findings reveal a nuanced landscape of family business governance in Uganda:

HR Policies as the Strongest Succession Driver: HR policies were highly institutionalized and emerged as the most potent predictor of succession planning, significantly predicting successor identification (β = 0.228, p = 0.004), training (β = 0.559, p < 0.001), and communication of intent (β = 0.121, p = 0.027).

The Paradox of Organizational Culture & Engagement: While organizational culture promoted ethical behavior and transparency, it had a weak, insignificant direct effect on sustainability (β = 0.047, p = 0.561), proving insufficient without formalized structures. Similarly, employee engagement positively predicted successor identification (β = 0.242) and sustainability (β = 0.258, p = 0.003), but paradoxically exhibited a negative effect on the communication of succession intent (β = -0.098), suggesting that blind loyalty to founders often stifles transparent succession dialogue.

Governance as the Catalyst for Sustainability: Corporate governance demonstrated a strong, direct positive effect on business sustainability (Regression β = 0.674, p < 0.001; SEM β = 0.492, p < 0.001), explaining 41.6% of the variance in business continuity.

The Mediating Role of Communication: SEM analysis confirmed that corporate governance partially mediates the relationship between succession planning and sustainability. Notably, the transparent communication of succession intent emerged as a critical, independent predictor of business sustainability (β = 0.209, p < 0.001).

5. Discussion and Conclusion

The study validates that the "three-generation rule" is descriptive, not deterministic. By integrating RBV and Stewardship Theory, the findings demonstrate that structured corporate governance disrupts the cycle of generational decline. HR policies provide the structural framework for objective successor identification, while governance translates cultural values and employee loyalty into measurable resilience. The study concludes that sustainability in Ugandan family-owned SMEs hinges on governance-driven succession. Without embedding formal governance into succession planning, family businesses remain highly vulnerable to collapse upon a founder's exit. With governance at the core, succession transforms from an ad-hoc familial handover into a strategic pathway for market growth and long-term viability.

6. Practical and Policy Recommendations

To secure the future of family-owned SMEs, the study recommends:

For SME Owners/Managers: Codify HR recruitment, leadership pipelines, and succession communication processes. Founders must establish advisory boards comprising both family members and external experts (in law, finance, HR) to balance kinship loyalty with independent oversight.

For Policymakers (Ministry of Trade & PSFU): Legislate or incentivize the formation of formal governance committees within family SMEs. Additionally, legislators should review the current Succession Act to explicitly incorporate family business succession plan provisions.

For HR Practitioners & Labor Unions: Formalize employee engagement through structured succession workshops and leadership forums. This shifts workforce engagement from "founder loyalty" to "institutional transparency," ensuring employees support rather than sabotage succession transitions.

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TOPIC

Beyond Price Competition: The Role of Emotional Response in Driving Customer Loyalty in Uganda's Petroleum Sector

Keywords: Emotional Response, Customer Loyalty, Petroleum Industry, Emotional Branding, Price Competition, Stabex Uganda.

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ABSTRACT

In Uganda's highly competitive petroleum retail sector, product homogeneity and strict price regulations render traditional, price-based competitive strategies increasingly ineffective. While rational loyalty driven by convenience and cost is well-documented, there remains a critical empirical gap regarding the role of affective factors in sustaining customer loyalty in Sub-Saharan African markets. Grounded in Emotional Response Theory (the Stimulus-Organism-Response framework), alongside the conditioning principles of Watson and Skinner, this study investigates the influence of emotional response on customer loyalty, focusing on Stabex Uganda Limited.

Employing a mixed-methods correlational cross-sectional design, the study gathered data from a stratified sample of 80 respondents comprising employees, retail customers, and commercial clients. Data were collected via semi-structured questionnaires and Key Informant Interviews (KIIs), and analyzed using SPSS. Descriptive findings revealed a high level of emotional engagement among respondents (Composite Mean = 3.71). Inferential statistics demonstrated a strong, positive, and statistically significant relationship between emotional response and customer loyalty ($r = 0.664$, $p < 0.01$). Furthermore, regression analysis confirmed that emotional response is a highly significant predictor of loyalty, accounting for 43.4% of its variance (Adjusted $R^2 = 0.434$, $F = 60.079$, $p < 0.001$). The study concludes that in environments where price competition is restricted, emotional loyalty—fostered through pleasure, arousal, trust, and advertising-induced affect—serves as a vital differentiator. The paper recommends that petroleum retailers shift from purely transactional marketing to deliberate emotional branding and customer experience optimization to secure long-term competitive advantage.

1. INTRODUCTION

Customer loyalty has evolved from a purely behavioral metric (repeat purchasing) to a multidimensional construct encompassing cognitive, attitudinal, and emotional dimensions. In Uganda's petroleum retail sector, fuel products are essentially standardized, pricing is highly transparent, and switching costs for consumers are minimal. Consequently, competing purely on price or location is an unsustainable strategy. Modern marketing paradigms suggest that sustainable loyalty is rooted in emotional attachment, where a brand becomes integrated into the consumer's self-concept. Despite global recognition of emotional engagement as a driver of loyalty, empirical research examining this dynamic within Uganda's petroleum retail context remains significantly limited. Most local studies prioritize supply chain dynamics, taxation, and regulatory frameworks, neglecting the affective drivers of consumer behavior. This study addresses this gap by investigating how emotional responses—specifically pleasure, arousal, and advertising-induced affect—influence customer loyalty at Stabex Uganda Limited, providing context-specific evidence for the East African market.

2. METHODOLOGY

The study adopted a mixed-methods approach, integrating a quantitative correlational cross-sectional survey with qualitative Key Informant Interviews (KIIs). The target population comprised employees and customers of Stabex Uganda Limited located in Wakiso District. Utilizing the Krejcie and Morgan (1970) table, a sample size of 80 respondents was determined and stratified into senior staff, other employees, retail customers, and commercial clients.

Primary data were collected using a validated self-administered questionnaire measuring emotional response constructs (pleasure, arousal, trust, and attitude toward advertising) and customer loyalty. The instrument achieved a Content Validity Index (CVI) of 0.8 and demonstrated high internal consistency (Cronbach's alpha > 0.6). Qualitative data gathered through KIIs provided depth to the statistical findings, exploring the mechanisms through which Stabex cultivates emotional connections with its clientele.

3. RESULTS AND DISCUSSION

Descriptive statistics indicated that respondents strongly agreed that advertising emotionally motivates purchases and fosters brand awareness (Mean = 3.71, SD = 1.196). Pearson correlation analysis revealed a strong, positive, and statistically significant relationship between emotional response and customer loyalty ($r = 0.664$, $p < 0.01$).

To determine predictive power, a linear regression analysis was conducted. Results demonstrated that emotional response is a robust predictor of customer loyalty, with the model explaining 43.4% of the variance in loyalty behaviors such as repeat purchases and brand advocacy (Adjusted $R^2 = 0.4434$; $F = 60.079$, $p < 0.001$). The standardized coefficient ($\beta = 0.664$) confirms that a unit increase in positive emotional engagement yields a proportional increase in customer loyalty.

These findings strongly align with the work of Aksoy et al. (2015) and Oliver (1999), confirming that customers exhibiting strong emotional connections yield higher lifetime value and resilience against competitor offerings. The qualitative insights further reveal that emotional loyalty is not automatic; it is deliberately nurtured through consistent positive service encounters, transparent communication, and value alignment, particularly regarding social responsibility. This challenges the traditional rational-choice models of loyalty, emphasizing instead that in highly saturated markets like Uganda's petroleum sector, affective commitment is the true driver of sustainable competitive advantage.

4. CONCLUSION AND RECOMMENDATIONS

This study establishes that emotional response is a critical and statistically significant determinant of customer loyalty in Uganda's petroleum retail sector. The 43.4% variance in loyalty explained by emotional metrics highlights that traditional price and convenience factors are insufficient for long-term retention.

To capitalize on these findings, the following recommendations are proposed for petroleum retail managers:

Strategic Emotional Branding: Design marketing campaigns that evoke specific positive emotions (joy, trust, surprise) to create deep psychological bonds with consumers.

Customer Experience (CX) Optimization: Ensure uniform, reliable service across all touchpoints to reinforce positive emotional conditioning.

Employee Empowerment: Train frontline station attendants as "emotional ambassadors" capable of creating memorable, trust-building customer interactions.

By transitioning from transactional marketing to emotional branding, petroleum companies in Uganda can transform occasional buyers into dedicated brand advocates.

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TOPIC

A Pilot Survey on Perceptions of Face Masks Use in Selected Communities in Entebbe Area, Uganda

Keywords: Face Masks, COVID-19, Perceptions, Public Health, Uganda, SOPs, Pilot Survey

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Abstract

Introduction

Globally, aerosol-transmitted infections such as influenza, SARS, MERS, and SARS-CoV-2 have demonstrated profound public health impacts. During the COVID-19 pandemic, the World Health Organization (WHO) strongly recommended the use of face masks as a critical Standard Operating Procedure (SOP) to mitigate transmission. In Uganda, the Entebbe area holds unique epidemiological significance as the location of Entebbe International Airport, where the country's index case of COVID-19 was identified and initially hospitalized. While public health directives mandated mask use, observational evidence suggested varied compliance and intricate behavioral nuances regarding how and why communities adopted or rejected masks. This pilot survey investigated community perceptions of face mask usage during the later phase of the COVID-19 pandemic in the Entebbe area.

Objectives

The study aimed to: (1) Carry out a pilot survey on community perceptions of face mask usage; (2) Highlight government supportive responses regarding mask accessibility; and (3) Document negative practices and physical challenges associated with mask usage.

Methodology

This cross-sectional pilot survey utilized a self-administered structured questionnaire to collect data from 507 randomly selected respondents across five distinct groups in Entebbe: urban primary school pupils (n=100), rural primary school pupils (n=100), peri-urban village members (n=100), rural village members (n=100), and university students/staff (n=108). Trained research assistants aided respondents with literacy challenges. Data were cleaned, entered, and analyzed using IBM SPSS Statistics 26, employing descriptive statistics and bivariate analysis (Chi-square). Additionally, the Principal Investigator documented direct observational field notes on mask misuse in the community.

Results

Demographics and Mask Accessibility The study achieved a 100% response rate. Females comprised 53.3% of the sample, and the dominant age group was 10-20 years (48.1%), reflecting the inclusion of

primary school pupils. An overwhelming 94.9% of respondents affirmed that wearing a face mask during the pandemic was a "good thing," and 98% confirmed they actually possessed a mask.

Table 1: Category of Participants and Mask Possession/Usage

PARTICIPANT CATEGORY	FREQUENCY (N)	PERCENTAGE (%)	POSSESS A MASK (%)	ACTUALLY USE A MASK (%)
University	108	21.3	98.0	89.2
Urban Primary Schools	100	19.7	98.0	89.2
Rural Primary Schools	100	19.7	98.0	89.2
Peri-Urban Villages	100	19.7	98.0	89.2
Rural Villages	100	19.7	98.0	89.2
Total	508	100.0	98.0	89.2

Despite 98% possession, a proactive community response was noted regarding mask sourcing: 64.5% of respondents purchased their own masks, 21.4% received them via government donation, and 12.4% received them from relatives.

Challenges and Intricacies of Mask Usage

While 89.2% reported actual usage, a significant gap existed between possession and consistent use. When probed, 60.2% of respondents reported facing challenges with mask usage.

Table 2: Specific Problems and Challenges Faced with Face Mask Usage (n=304)

CHALLENGE EXPERIENCED	FREQUENCY (N)	PERCENTAGE (%)
Makes breathing difficult	211	69.4
Makes face look funny / disfigures looks	49	16.1
Brings a skin rash	22	7.2
Other specific complaints	22	7.2
Total	304	100.0

Note: "Other" complaints (categorized by respondent type) included: excessive facial sweating (Uni, P.Sc, Villages); vapour disturbing spectacles and causing dizziness (Uni); rubbing off lipstick and fear of causing cancer (Villages); ear pain and inability to talk properly (Villages); and embarrassment wearing a mask among unmasked peers (Villages).

Vaccination Perceptions and Observational Misuse

Regarding vaccination, 89.2% believed COVID-19 vaccination was crucial. Encouragingly, 67.4% correctly acknowledged that individuals should continue wearing masks even after receiving the vaccine. Bivariate analysis showed a significant association between age category and how masks were acquired ($p = 0.000$), but no association between gender and the perception that mask use is good ($p = 0.314$).

Direct field observations by the research team revealed widespread negative practices that compromised mask efficacy, including: wearing masks over the mouth only (leaving nostrils exposed), wearing masks on the chin or forehead, substituting surgical masks with plastic face shields, and reusing damp or dusty masks.

Discussion

The findings present mixed implications for public health policy in Uganda. The high awareness (94.9%) and proactive self-purchasing of masks (64.5%) represent a victory for Ministry of Health (MoH) risk communication; communities did not passively wait for government handouts during a deadly pandemic. However, the physical discomfort of masks specifically breathing difficulty (69.4%) served as a primary barrier to consistent use. This aligns with Matuschek et al. (2020), who noted that exhaled moisture dampens masks, making them airtight and inducing respiratory distress.

Interestingly, vanity and social pressure played a notable role in mask hesitancy. Complaints about disfigured facial looks (16.1%), ruined lipstick, and the embarrassment of wearing a mask among unmasked peers highlight the socio-psychological barriers to compliance that standard health education often ignores. Furthermore, the observational data regarding misuse (e.g., mouth-only covering) suggests that merely possessing a mask does not equate to biological protection.

Conclusion and Recommendations

Communities in the Entebbe area exhibited high COVID-19 risk awareness and mask accessibility, but physical discomfort and socio-psychological factors significantly hindered optimal usage.

Recommendations: The MoH and health educators must move beyond basic "wear a mask" directives. Future health education campaigns should: (1) educate the public on proper mask fitting to reduce breathing difficulty and ear pain; (2) address misconceptions, such as the false belief that vaccination eliminates the need for masks; and (3) specifically target observed negative practices (e.g., wearing masks under the chin) to ensure that the physical presence of a mask translates into actual epidemiological protection.

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Master of Monitoring and Evaluation	2 years	WKD, DL
Masters in Human Rights and Human Dev't	2 years	DL
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Dip. Guidance and Counselling	2 years	DL
Dip. International Relations and Diplomacy	2 years	FT, WKD, DL
Dip. Journalism and Public Relations	2 years	FT, WKD
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Bachelor of Information Systems and Technology	3 years	FT, EVE, WKD
Bachelor of Science in Cyber Security and Digital Forensic	3 years	FT, EVE, WKD
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MSc. in Natural Resources Management	2 years	WKD
MSc. in Applied Geo-Sciences (Msc.AG)	2 years	WKD
MSc. in Agribusiness (Msc.AB)	2 years	WKD
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Undergraduate Programmes

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BSc. in Petroleum and Minerals Geoscience	3 years	FT, WKD
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BSc. in Agribusiness	3 years	FT, WKD
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BSc. Fisheries Management and Technology	3 years	FT, WKD
BSc. in Human Nutrition and Clinical Dietetics	3 years	FT, WKD
BSc. in Medical Records and Health Informatics	3 years	FT, WKD
BSc. in Economics and Statistics	3 years	FT, WKD
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Diploma in Hotel Management and Catering	2 years	FT, WKD
Diploma in Petroleum and Minerals Geoscience	2 years	FT, WKD
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