

CHUKA



UNIVERSITY

Knowledge is Wealth/Akili ni Mali (Sapientia divitia est)

8th International Research Conference

Theme:

**“Higher Education Strategies for Mitigating
Impacts of Pandemics.”: Proceedings**

Dates:

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Edited by:

Prof. Dorcas K. Isutsa

CHUKA UNIVERSITY FUNDAMENTAL STATEMENTS

Motto: Knowledge is Wealth/Akili ni Mali (*Sapientia divitia est*)

Slogan: Inspiring Environmental Sustainability for Better Life

Philosophy: Quality education, training, research, extension, environmental sustainability, and entrepreneurship lead to social cohesion, human integrity, and economic development

Vision: A Premier University for the provision of quality education, training and research for sustainable national and global development

Mission: To provide access, generate, preserve and share knowledge for quality, effective and ethical leadership in higher education, training, research and outreach through nurturing an intellectual culture that integrates theory with practice, innovation and entrepreneurship.

CORE VALUES

- (1) Customer Value and Focus
- (2) Diversity and Social Fairness
- (3) Environmental Consciousness
- (4) Fidelity to the Law
- (5) Innovation
- (6) Integrity
- (7) Passion for Excellence
- (8) Peaceful Co-Existence
- (9) Professionalism and Confidentiality
- (10) Prudent Utilisation of Resources
- (11) Teamwork
- (12) Timeliness and Devotion to Duty

DISCLAIMER

Views expressed in in these proceedings are those of contributing authors and do not in any way represent views of Chuka University, Division of Academic, Research and Student Affairs, or Board of Research, Extension and Publications. The organisers reserve the right to edit the manuscripts to meet required scholarly standards.

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PREFACE

Chuka University is the 9th Chartered Public University in Kenya. It organized the 8th Annual International Research Conference on 7th and 8th October, 2021. The theme of the 8th Conference was: **“Higher Education Strategies for Mitigating Impacts of Pandemics”**.

The Conference theme was in line with modern times that require developing advanced research strategies and technologies for combating emerging health and socio-economic threats of pandemics. It was anticipated that it would contribute effective and efficient strategies for mitigating the ravages of pandemics. Together with the subthemes, it aspired to link scholars, researchers, industrialists and policy-makers to establish firm partnerships for restoration of thriving and safe new world order.

The organizers set six subthemes for this Conference. These were: agricultural and environmental mitigation strategies; arts, humanities and social sciences mitigation strategies; education and training mitigation strategies; health sciences and affirmative action mitigation strategies; hospitality and business-related mitigation strategies; and science, engineering and technological mitigation strategies.

Furthermore, the conference had four objectives; namely to: Share effective strategies and technologies for mitigating impacts of pandemics; Deploy new knowledge in policy setting to mitigate impacts of pandemics; Interrogate higher education strategies for accelerating pandemic recovery; and Forge collaborative partnerships for sustainable pandemic recovery.

We subsequently received 116 abstracts from Kenya and beyond, in all sectors of the economy. Many higher education institutions were represented in the Conference either through direct entry or collaboration. Similarly, many allied institutions were also represented. We were grateful to all delegates who responded to participate in the Conference through the various thematic plenary sessions. Networking sessions proceeded concurrently during health breaks.

These proceedings were compiled using manuscripts submitted for the conference presentation, sharing and dissemination of research findings. High quality manuscripts will be upgraded for review and publication in the Chuka University Journal for Environmental Sustainability Enhancement Research (JESAR) Volume 8. The organizers ensured the conference enlightened and empowered participants with pandemic and related emergencies mitigation strategies.

Professor Dorcas K. Isutsa, Ph.D.

Deputy Vice-Chancellor (Academic, Research & Student Affairs)

OFFICIAL OPENING SPEECH

Our Chief Guest, Dr. Tonny Omwansa, who is the CEO of the Kenya National Innovation Agency, Chuka University staff, distinguished participants, Ladies and Gentlemen, good morning. First, kindly receive the apology of the Vice-Chancellor who is in another function away from the University. He has send his warm regards to all of you. He is grateful that you have planned and accepted to participate in our Conference. Kindly feel appreciated.

On his behalf and my own behalf, I warmly welcome you to Chuka University. The University has organized this 8th Conference to be held on 7th and 8th December, 2021. The theme is: “Higher Education Strategies for Mitigating Impacts of Pandemics”.

The theme is in line with modern times that require developing advanced research strategies and technologies for combating emerging health and socio-economic threats of pandemics. It is anticipated that it will contribute effective and efficient strategies for mitigating the ravages of pandemics. Together with the subthemes, it aspires to link scholars, researchers, industrialists and policy-makers to establish firm partnerships for restoration of thriving and safe new world order.

The organizers set six subthemes for this Conference. These are:

1. Agricultural and Environmental Mitigation Strategies
2. Arts, Humanities & Social Sciences Mitigation Strategies
3. Education and Training Mitigation Strategies
4. Health Sciences & Affirmative Action Mitigation Strategies
5. Hospitality and Business-Related Mitigation Strategies
6. Science, Engineering and Technological Mitigation Strategies

The objectives are to: Share effective strategies and technologies for mitigating impacts of pandemics; Deploy new knowledge in policy setting to mitigate impacts of pandemics; Interrogate higher education strategies for accelerating necessary recovery; Forge collaborative partnerships for sustainable economic recovery.

We have subsequently received 116 abstracts from Kenya and beyond, in all economic sectors. I am delighted to note that many higher education institutions are represented either directly or via collaboration. Similarly, many allied institutions are also represented. We are grateful to all delegates who are participating in this Conference through the various subthemes.

Our Chief Guest, allow me to give an overview of how Chuka University has strategized and positioned itself to contribute to mitigating the impacts of pandemics by presenting the University’s history briefly.

Chuka University is the 9th Chartered Public University in Kenya. It started prophetically around colonial times in the 1950’s when area residents decided to use education to develop their livelihoods and do away with colonial masters. It is located in Meru South, Tharaka-Nithi, at about 180 km from Nairobi on the slopes of Mt. Kenya. Since elevation to a full-fledged University on 8th January, 2013, it has been organising international research conferences to disseminate and share current research findings. The Conferences have helped the University fulfill its triple mandates of provision of higher education, research and extension services, as well as strategic plan and performance contract targets. This conference represents the 8th cycle of fulfilling the mandates and PC targets. Chuka University has since inception developed tremendously in all respects from humble beginnings to greater heights, including a few that are outlined below. It thus has:

1. A 9-member Council that sets governance policies to help mitigate impacts of pandemics.
2. An executive Vice-Chancellor and 2 Deputy Vice Chancellors, and middle level management staff who manage the University’s affairs round the clock.
3. A population of nearly 20,000 students, as well as over 20,000 graduates that provide skilled human resource to help mitigate impacts of pandemics in diverse ways.
4. A total of 700 skilled staff in academic and administrative posts, who are engaged in training skilled human resource, as well as innovative research and extension work.
5. A total of 200 academic programmes at diploma, bachelors, masters and doctorate levels that facilitate training of requisite human resource to help mitigate impacts of pandemics.
6. In place 15 Departments, 8 Faculties, 9 Directorates, 4 Campuses, & 1 University College to coordinate education, research and outreach activities to help mitigate pandemics.

7. Land measuring over 680 acres, which is secured with title deeds. The land is used for establishing educational infrastructure like lecture theaters, laboratories, Parks, Offices, as well as demonstration of modern farming technologies to enhance food security.
8. Embarked on construction of 2 more Faculty complexes on top of 5, a science and technology research park, a food technology complex, a business centre, 3 modern hostels, and a modern 5,000-seater library, all costing KES 10 b, to ensure continuity of its mandate.
9. Constructed 3 million litre underground tank, and 10 million litre research farm water dam to completion for modern farming, sanitation and hygiene standards.
10. Assortment of 26 vehicles including a firefighting engine, buses, trucks, vans and salons to ease mobility and ensure safety.
11. An assortment of 130 modern laboratory equipment, costing a total of KES 208,000,000, for conducting modern research and innovation to mitigate impacts of pandemics.
12. An educational and community outreach 98.8 FM radio station to disseminate information on mitigating impacts of pandemics.
13. A Quality Management System since 2012, presently based on ISO 9001:2015 Standard so as to be at par with international trends in pandemic mitigation.
14. Operationalized an internal research fund that supports staff and postgraduate students to conduct research and innovation to help mitigate impacts of pandemics. Products include:
 - (a) Chuka University liquid soap/detergent/dispensers
 - (b) Chuka University sanitisers
 - (c) Chuka University bottled water
 - (d) Chuka University yoghurt, in the pipeline
15. Established a research proceedings series and Journal for Environmental Sustainability Enhancement Research that will help disseminate findings on how to combat pandemics.
16. Approval to establish a UNESCO Chair on Conservation of the Environment and Water for Sustainable Development (CEWSD).
17. Establishment of Technology and Innovation Support Centre (TISC) in liaison with KIPI.
18. Staff and students trained in writing research grant proposals and policy briefs that will help accelerate combating of future pandemics.
19. Facilitated its staff and students to publish over 1,000 articles and books to date, some of which contain messages on how to mitigate impacts of pandemics.
20. Enrolment preference that has remained among the top 10 out of 80 Universities in Kenya and staff trained abroad to ensure continuity of University business.

All these governance and administrative structures, physical and human resources, capacity building discourses and efforts position Chuka University in prime position of conducting cutting edge research and innovation that can lead to revitalization of economic recovery and mitigate impacts of pandemics.

Our Chief Guest, we are looking forward to your keynote address to advise the University on how to go about commercializing some of its research and innovative products. We appreciate the partnership we have forged with KIPI, KWS, KALRO, KEMI, KEPHIS, NRF, NaCoSTI, KNATCOM, KENIA, and various international ones. We are grateful to the financial support from the University through the Vice-Chancellor, the NRF, and our Council for moral support.

In conclusion, I wish to let all participants to know that we shall package full manuscripts submitted into proceedings by December, 2021 and upgrading highest quality ones for review and publication in the Chuka University Journal for Environmental Sustainability Enhancement Research (JESAR) by January, 2022. We hope you shall find this Conference engaging and informative. Kindly leave us feedback to help us improve future Conferences. We look forward to reverting to our usual elaborate programming once the country is free of COVID-19 challenges. For now, keep safe always.

On behalf of the Vice-Chancellor, Prof. Erastus Njoka, and with these many remarks, I declare this Conference officially opened.

Professor Dorcas K. Isutsa, Ph.D.

Deputy Vice-Chancellor (Academic, Research & Student Affairs)

KEYNOTE ADDRESS: THE ROLE OF KENIA IN MITIGATING IMPACTS OF PANDEMICS

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Introduction of KENIA

The Kenya National Innovation Agency (KeNIA) is a State Corporation established under the Science, Technology and Innovation (STI) Act, No. 28 of 2013 under the Ministry of Education to enhance the National Innovation System. The core mandate of the Agency is to develop and manage the National Innovation System. The Agency is therefore responsible for co-ordination, promotion and regulation of the National Innovation Ecosystem. With the vision of being a key enabler of socio-economic development through innovation, KeNIA was set up to develop and manage the national innovation system. Working with partners, KeNIA strengthens interrelationships between actors in order to promote innovation and enterprise development out of research and ideas. From supporting the identification, recording and protection of innovative ideas to coordinating the establishment and implementation of appropriate policies, standards, processes, infrastructure, and partnerships to nurture the innovative ideas. The agency also works with partners to ensure appropriate prioritization, relevant capacity development, innovation recognition and publication of the same. **Our Mission:** To develop and manage a dynamic national innovation system that facilitates taking ideas to the market. **Our Vision:** A key enabler of socio-economic development through innovation.

KENIA Strategic Priorities

Below are six strategic priority areas that capture the different facets of our core mandate to effectively enable the innovation system in Kenya.

(i) Capacity Development

Innovative mindsets and skills are necessary to spur creation of products and services that are truly problem based and have the potential to impact society. KeNIA is anchored at the Ministry of Education giving access to all academic institutions who are very core to capacity building. KeNIA strives to cause the creation of science and innovation parks, centers of excellence in priority sectors; support the inculcation of relevant skills such as human centered design, design thinking, problem based learning, intellectual property management, innovation leadership, 21st century skills, value proposition development, business modeling among others, to the broader community in the country. KeNIA is working to strengthen both the institutional capacity of the agency and the broader ecosystem. The agency is working to grow capacity of competent persons to support the implementation of the agency.

(ii) Dissemination & Awareness

Innovation takes places in all sectors and levels of society. There is need for coordinated innovation information sharing and dissemination. KeNIA endeavors to keep stakeholders informed and updated on the state and development of our national innovation system. Using a variety of tools and techniques, KeNIA collaboratively harvests and analyzes relevant data and organizes it for dissemination through appropriate channels. By enhancing awareness, KeNIA hopes to inspire more people to get more involved in transforming the nation through innovation.

(iii) Commercialization

Commercialization is a necessary step for business success of start-up ventures or public and private research efforts. KeNIA works with academic institutions among other partners to improve the level of uptake and commercialization of intellectually protected products and services. Initiatives include enhancing awareness of the commercialization processes; strengthening operational linkages among the academia, industry and government; organizing forums for exchange of knowledge and experiences; supporting with legal frameworks and the infrastructure to enhance innovation, incubation and commercialization. This priority area requires working very closely with institutions of higher learning, research centers, private sector including manufacturing companies, development partners and the international community.

(iv) Policies & Legal Frameworks

KeNIA works with a variety of stakeholders to ensure the inclusion of science, technology and innovation in the country's programs and policies at all levels. KeNIA is also mandated to coordinate the implementation of national innovation and commercialization policy. As a mechanism of encouragement and motivation, KeNIA establishes

and maintains a variety of award systems for novel innovations subject to prescribed conditions. Working closely with the National Council of Science, Technology and Innovation, and other partners, KENIA builds policies and frameworks that would spur the advancement of research to commercialization and enterprise development.

(v) Partnerships & Linkages

KeNIA strives to institutionalize linkages between universities, research institutions, the private sector, the government, and other actors. In collaboration with various partners, KeNIA is establishing a database of innovations, investors, institutions, innovators, enablers among others relevant elements of the ecosystem. KeNIA supports the establishment and maintenance of strategic international and regional innovation cooperation platforms that would foster the sharing of information and expertise between institutions. Further, KeNIA is mandated to identify and establish innovation think tanks to support the growth of the national innovation system

(vi) Funding

KeNIA recommends the provision of financial and any other assistance to any person or institution, for the purpose of developing technological innovations. Working with other enablers, KeNIA aims to nurture innovative ideas from individuals, training institutions, the private sector, and similar institutions. Other forms of support include facilitation of applications for grants, development of strategies for resource mobilization for strategic innovation programs, and the development of schemes to fund and support innovation platforms and programs.

How We Support Innovators

Working with key partners, we support Kenyan innovators through various programs. For each program a call is made yearly for applicants to submit their innovations for review. The top innovations are thereafter selected for the particular program.

Wait for a call for applications => Apply to a program => Get selected

KENIA Initiatives

(i) National Innovation Awards (NIA)

NIA recognizes & honors Kenya's leading innovators with remarkable achievements in their fields. The purpose of the National Innovation Award is to stimulate and encourage innovation in national priority areas. The Award therefore plays a critical role in strengthening the national innovative capacity through motivation, recognition, and support of innovators.

(ii) Innovation Champions

Kenya National Innovation Agency (KeNIA) is building pool of innovation champions across government, private sector, institutions of higher learning, research centers and Technical and Vocational Education and Training (TVETs). The champions become the agents of sustaining innovation momentum in local institutions through capacity building of colleagues, organizing events, scouting innovations, building partnerships, mentoring innovators and startups among others.

About the Program: Innovation Champions program is designed to enhance capacity of innovation-enthusiastic individuals in institutions who wish to become transformative agents of their community. KeNIA will support the champions to build networks, access resources, plan and execute local initiatives that would energize the local innovation movement. KeNIA organizes training programs that champions will be invited to attend, including but not limited to innovation management, commercialization of research, technology transfer, incubation management and resource mobilization. KeNIA may be able to sponsor some of the innovation fellows to attend training programs. Scholarships will be based on a criterion developed and implemented by KeNIA. As part of the initial five-day induction workshop, innovation champions will be guided to develop localized and realistic plans for their institutions and would be supported by KeNIA in most practical ways to implement these plans over time. KeNIA will remain in touch with champions to support the implementation of their plans. Plans would include practical activities such as planning and executing innovation summits, building partnership, developing incubation policies, proposing institutional reforms among others.

How it Works: The championship begins with you being nominated for the program and being selected after a thorough vetting process. On selection there will be periodical communication on the status of the program, and other details of the same. You only become a fully fledged Innovation Champion after completing the Induction Program, and by extension, the Technology Transfer and Commercialization workshop.

Get Nominated for Consideration.: You can get nominated by a notable person from your institution here to be considered.

Be Vetted by the KeNIA Secretariat.: Your application will go through an iterative vetting process.

Get Admitted into the Program.: Involves various activities and trainings that will enhance your innovative capacity. See workshops here.

Champion Innovation Agenda: In collaboration with KeNIA, continuously champion innovation agenda in your institution.

Enhance Your Innovation Influence: Enhance your influence in your institution with support from KeNIA

(iii) Innovation Academy

This is a programme, supported by several partners working to building innovative capacities of interested individuals and support integration of innovative practices into institutions. Through the academy, KeNIA aims to build an integrated community of passionate individuals interested in developing innovative and actionable solutions to existing challenges that would transform their organizations. Prepare to challenge the status quo and deliver new disruptive policies, products, services and processes. Create innovative leaders

(iv) Research Commercialization Support

KeNIA, working with several partners is developing a framework to support commercialization of research and ideas from individuals, academic institutions, and research organizations. Commercialization support will range from enhancing IP management awareness and protection, supporting consolidation of commercializable work as well as nurturing partnerships that would support protection, organization and scaling of research and innovation work. The climax of the commercialization support efforts would be an annual commercialization summit that would connect researchers and innovators to investors, industry partners and the broader community. Through these efforts, KeNIA hopes to build a vibrant network to enhance innovation. If you wish to partner with KeNIA on this initiative, contact us.

(v) Startup Ecosystem Support

One of the goals of innovating is to establish startups that are scalable and sustainable. Startups operate in challenging environments, developing unique products or services and bring them to market. Working with various partners KeNIA was set up to support the startup ecosystem by forging more collaboration between stakeholders; consolidating and disseminating relevant data that enhances understanding of the ecosystem; increasing visibility of efforts by innovation hubs, incubators, and accelerators; promoting best practices as well as catalyzing funding and investment in startups. The climax of these efforts will be an annual national startup summit to celebrate the nexus of ambitious innovation and entrepreneurship. The forum will bring together innovators, startups, entrepreneurs, investors, policy makers and partners to network and propel the innovation ecosystem.

(vi) Leaders in Innovation Fellowship

The objectives of the Leaders in Innovation Fellowships (LIF) programme are:

- (a) To build the capacity of researchers for entrepreneurship and commercialization of their research;
- (b) To create international networks of innovators and technology entrepreneurs.

The programme is aimed at researchers who are about to develop, or are in the process of developing, a business proposition for their innovation. A select cohort of researchers will benefit from a focused period of training in the UK, access to expert coaches, and opportunities for international networking. In the short term, they will develop with the support of the programme - a commercialization plan for their innovation. In the long term, they will benefit from access to an international network of peer innovators, in taking their commercialization plan forward.

Relevant Resources: Funding and Investment, Training, Commercialization, Startups

For more details about KENIA: log onto: <https://www.innovationagency.go.ke/>

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