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Integrating Indigenous Knowledge into Kenya's Science, Technology and Innovation Ecosystem

INTRODUCTION

Kenya has a rich heritage of indigenous knowledge (IK) which hold tremendous potential for promoting sustainable development, people's wellbeing and maintaining a healthy environment. The UN Sustainable Development Goals (SDGs) recognizes the need to protect traditional knowledge due to its ability to tackle the triple crises of climate change, biodiversity loss and pollution in the world. Indigenous knowledge is acknowledged as a cross-cutting enabler of several SDGs. Integration of IK into ongoing scientific and technological processes is crucial for the realization of inclusive and sustainable development which provides innovative solutions to communities and preserves cultural heritage.

Globally and locally, however, the integration, utilization, preservation and protection of IK remains low, yet there is evidence on the practices employed by indigenous peoples in areas such as agriculture, medicine, environmental conservation, and climate resilience. Despite its proven value and provision of context-specific insights, IK has often been overlooked by conventional science and viewed as inferior without clear methodological approaches to guide its utilization, scalability and intellectual protection. The lack of integration has resulted in missed opportunities for innovation, sustainability, and resilience.

The indigenous knowledge ecosystem in Kenya is defined by a comprehensive legal and policy framework aimed at preservation, promotion, and equitable benefits sharing. This framework is anchored in the National Policy on Traditional Knowledge, Genetic Resources and Traditional Cultural Expressions of July 2009, and the Protection of Traditional Knowledge and Cultural Expressions Act, 2016. Further, the Constitution (2010), the Science, Technology and Innovation Act, 2013 and Kenya's international obligations such as the Convention on Biological Diversity (CBD) together with its associated Protocols - the Cartagena Protocol on Biosafety, the Nagoya Protocol, and the Nagoya-Kuala Lumpur Supplementary Protocol

Implementation of the legal and policy framework has, however, faced significant challenges. For instance, there is no clarity on which ministry is responsible for implementing the Protection of Traditional Knowledge and Cultural Expressions Act, No. 33 of 2016. The Protection of Traditional Knowledge and Cultural Expressions Act, No. 33 of 2016 (Miscellaneous Amendments) Bill, 2018, proposed the Ministry of Sports and Heritage as the responsible authority, which may not be well-suited to oversee its full implementation. The delay in establishing the proposed Traditional Knowledge Digital Repository (IKDR) to document and register IK and TCEs has hindered the protection and promotion of IK and TCEs.

The National Museums and Heritage Act, Cap 6 of 2006, establishes the National Museums of Kenya (NMK) as the legal custodian of the nation's natural and cultural heritage. The NMK is tasked with identifying, protecting, conserving, and transmitting Kenya's cultural and natural heritage. This mandate has not been fully implemented as it lacks incentives for communities and individuals to invest in income-generating cultural resource conservation programs, impeding efforts in sustainable development and social well-being.). The guidance on procedures for involving other stakeholders in the use of cultural resources is vague, leading to potential conflicts and inefficiencies. Finally, the NMK's role in conducting Environmental Impact Assessments (EIA) for proposed development projects overlaps with that of the National Environment Management Authority (NEMA), leading to potential conflicts and inefficiencies.

Current Status

Recognizing the need to integrate IK into national development agendas amid threats from globalization, commercialization, and inadequate legal protection, the policy enacted in 2009 marked a great milestone in securing Kenya’s rich IK heritage. The policy emphasizes the importance of recognizing IK as a living body of knowledge rooted in the daily practices and worldviews of Kenya’s communities—covering areas like indigenous medicine, agriculture, environmental stewardship, and cultural expressions.

The second milestone came in 2010 with the passage of the Constitution which recognizes IK in Articles 11, 40, and 69. Article 11 acknowledges culture as the foundation of the nation and commits the state to promote and protect indigenous knowledge. Article 40 secures property rights, including those linked to intellectual property, while Article 69(1)(c) mandates the state to protect and enhance indigenous knowledge of biodiversity and genetic resources.

Operationalization of these constitutional provisions was realized through the enactment of the Protection of Traditional Knowledge and Cultural Expressions Act, 2016. It provides a detailed legal mechanism for the recognition, documentation, management, and protection of IK and traditional cultural expressions (TCEs). The Act defines traditional knowledge broadly to include skills, practices, innovations, and codified systems related to areas such as agriculture, medicine, and environmental knowledge. It also outlines cultural expressions in both tangible and intangible forms, from oral literature and rituals to visual arts and architecture.

Under the Act, both national and county governments are tasked with specific responsibilities. County governments are responsible for the primary registration and documentation of IK and

TCEs within their jurisdictions, while the national government, through agencies such as the Kenya Copyright Board, maintains a Traditional Knowledge Digital Repository. Registration itself is not mandatory nor a condition for rights—it serves a declaratory function and must be based on prior informed consent of the holders.

The Act recognizes communities as holders of IK with exclusive rights to authorize or refuse its use, to benefit from its commercialization, and to seek remedies in case of infringement. It further provides moral rights for communities, ensuring proper attribution and protection from derogatory use. Notably, it provides mechanisms for equitable benefit sharing and outlines the requirement for user agreements, with robust provisions for prior informed consent, dispute resolution, and sanctions against misuse. The Act provides for reciprocal arrangements which gives protection to foreign IK and TCEs within Kenyan jurisdiction.

The Natural Products Industry (NPI) Initiative is a Vision 2030 flagship project aimed at building a vibrant natural products industry through the development and exploitation of an interface between indigenous knowledge and modern science, technology, and innovations. The NPII has under the leadership of NMK engaged in a programme to document and digitize IK intellectual assets with a view to develop and commercialize products to generate income for the local communities and county governments. The programme popularly known as DoDi is a partnership involving state agencies, county governments and local communities has upto now developed an Indigenous Knowledge Innovation Bank (InKiBank) containing IK assets from different counties.

Kenya's legal and policy regime is aligned to its international obligations under the CBD and the Nagoya Protocol, which promote fair and equitable sharing of benefits from the utilization of genetic resources. This positions Kenya within global efforts to recognize community rights and prevent biopiracy.

In its 6th report submitted to the CBD in 2020, Kenya outlined the policy, constitutional, legislative, institutional measures undertaken towards meeting its obligations to protect, conserve and sustainably use its biodiversity while ensuring fair and equitable sharing of the benefits accrued. These include ratification of the Nagoya Protocol, which reinforces access and benefit-sharing (ABS) mechanisms and integration of traditional knowledge into biodiversity conservation strategies through institutions such as the National Environment Management Authority (NEMA) and the Kenya Wildlife Service (KWS). The report further indicated the efforts being made to promote community participation in conservation through

County Integrated Development Plans (CIDPs) and the recognition of Community Conserved Areas (CCAs). This has provided a platform for Indigenous Peoples and Local Communities (IPLCs) to make their contribution through sharing their traditional ecological knowledge.

Kenya's efforts in preservation of genetic resources through development of the National Genebank, an ex-situ conservation facility and establishment of the Genetic Resources Research Institute (GeRRI) were also mentioned in the report. Amendment of the Seeds and Plant Varieties Act and the enactment of the Wildlife Conservation and Management Act have enhanced protection of genetic resources.

There has been tremendous progress towards integration of IK into the health and agriculture sectors in Kenya, reflecting a growing recognition of its value for sustainable development and biodiversity conservation. The efforts being spearheaded by institutions such as the Kenya Medical Research Institute (KEMRI) and NMK have created opportunities for collaboration with indigenous communities to conduct research on the pharmacological potential of medicinal plants used by local communities to treat common ailments and document traditional medicinal practices. These initiatives aim to validate and integrate traditional medicine into community-based healthcare solutions and national healthcare systems as well inform national public health strategies.

In agriculture, IK plays a central role in promoting sustainable practices and conserving agrobiodiversity. Community seed banks have been established in various regions, notably in arid and semi-arid lands, to preserve indigenous crop varieties that are resilient to local climatic conditions. These banks are managed by farmers who use and exchange traditional seeds, thus safeguarding genetic diversity and enhancing food security. Furthermore, ecological or agroecological farming practices rooted in traditional knowledge—such as intercropping, organic fertilization, and pest control using plant-based remedies—are

increasingly being adopted and promoted by development partners and government programs. These practices are central to biodiversity conservation and local communities' empowerment, particularly focusing on women, who are often custodians of traditional agricultural knowledge.

Amidst these efforts however, challenges persist, which limits the benefits accrued to local communities, high levels of extraction of local resources and extinction of IK. This is mainly due to the limited awareness among communities of their rights under the law, bureaucratic hurdles in documentation, and ongoing risks of misappropriation. Additionally, while the policy and legal framework is robust, enforcement is low and uneven marred by insufficient institutional coordination, limited financial and technical capacity.

Methodology

The development of this policy brief entailed in-depth literature review of relevant literature; a review of the policy and regulatory environment and engagement of stakeholders drawn from the government-funded Indigenous Knowledge Documentation and Digitization (DoDi) Project. The Ministry of Tourism, Wildlife, Culture and Heritage, through the National Museums of Kenya's NPI initiative is spearheading the three-phase project. Other agencies involved are Kenya Industrial Property Institute (KIPI), Kenya Copyright Board (KECOBO), Kenya Institute of Primate Research (KIPRE), Kenya Wildlife Service (KWS) and NACOSTI.

Implementation of the DoDi project involves the following:

i. Mapping key stakeholders at county and community levels.
ii. Establishing community governance, identifying indigenous knowledge (IK) holders, and assigning consent signatories.
iii. Selecting IK assets for documentation under technologies, foods, medicines, heritage sites, music & dance.
iv. Identifying and training youth cultural champions for documentation and digitization.
v. Providing secure facilities and ICT for the county digital repository.
vi. Integrating IK DoDi Project into the County Integrated Development Plan (CIDP).
vii. Forming a county IK DoDi team with relevant County Executive Committee Members (CECMs), attorney, and commissioner.

At the end of each phase, it is envisioned that Investment Conferences will be planned where the counties will show case their Indigenous Knowledge Innovative Assets (IKIA) to investors, for possible further development.

Opportunities for Integration of IK into STI

Integration of indigenous knowledge into Kenya's STI ecosystem offers a critical pathway for the country's approach to the realization of inclusive and sustainable development. Indigenous knowledge systems serve as a reservoir of contextualized insights and experiences which are relevant for communities to come up with innovative solutions to address some of the most pressing challenges such as climate change, and pandemics.

The literature reviewed in the course of development of this policy brief reveals several key issues for consideration as the country pursues integration of IK into STI. First, Kenya is home to **vast and valuable indigenous assets**. Across the country, communities have long developed adaptive systems and technologies that address critical areas such as health, agriculture, environmental management, and climate resilience. These indigenous technologies and practices are affordable, accessible and are suited to the local socio-ecological context, making them ideal for integration into contemporary scientific systems.

Second, **digitization** acts as a catalyst for knowledge preservation, transfer, and innovation. By leveraging digital tools to document, validate, and disseminate Indigenous Knowledge, Kenya can bridge the gap between traditional knowledge systems and scientific inquiry. This enhances accessibility to a wide range stakeholders such as researchers and innovators, which fosters a deeper understanding and application of indigenous systems within formal research and innovation processes. Through validation and collaborative approaches, indigenous knowledge and practices can be refined and enhanced using modern technologies, resulting in solutions that are inclusive, locally adapted, and culturally grounded.

Third, training and involvement of community members in the documentation and digitization of IK helps cultivate grassroots innovation ecosystems, strengthens local capacity, and ensures that development pathways reflect community priorities and values.

Fourth, as these knowledge assets are digitized, they create a rich database for interdisciplinary, data-driven research. Researchers and innovators can access data and insights to explore new frontiers in medicine, agriculture, architecture, arts and other disciplines to generate contextual evidence-based innovations.

Fifth, development of digital repositories and ICT hubs at the county level is needed to ensure equitable access to innovative resources and enhance resilience. These localized platforms will democratize innovation and strengthen county-level STI ecosystems aligned to national development goals.

Finally, integrating IK into STI is not limited to technical domains alone. Cultural innovation such as music, dance, and traditional crafts offers substantial economic potential. By documenting and digitizing cultural expressions, Kenya can stimulate growth in the creative economy, positioning culture as a driver of digital innovation and job creation.

The integration of IK into Kenya's STI ecosystem presents a transformative opportunity. Through strategic digitization, validation, and community engagement, Kenya can unlock a future where science and tradition coalesce to generate sustainable, inclusive, and locally meaningful innovation.

POLICY RECOMMENDATIONS

To strengthen the integration of IK into Kenya's STI ecosystem, this policy brief outlines targeted recommendations for key actors involved in policy formulation and implementation in the domains of IK and STI. The integration of IK is vital to fostering inclusive, sustainable, and locally meaningful solutions to national and local development challenges.

The National and County Governments bear the primary responsibility of embedding IK within the broader STI policy and regulatory frameworks. This includes formulating legal, institutional, and administrative instruments that guide the protection, promotion, and utilization of IK. It also entails aligning STI strategies with Kenya's cultural and ecological diversity to ensure that local knowledge systems contribute meaningfully to innovation and development outcomes. Governments at both levels should also prioritize resource allocation for collaborative research initiatives that connect traditional knowledge holders with scientific institutions, thereby encouraging co-creation, mutual learning, and interdisciplinary innovation.

Academic and research institutions have a critical role to play in the research, testing, and validation of indigenous technologies. By partnering with local communities, these institutions can help document, refine, and elevate traditional practices into viable scientific innovations. Such collaborations should be supported by ethical frameworks that respect the autonomy and intellectual contributions of indigenous knowledge holders.

To further safeguard the rights of communities, the development of a robust intellectual property (IP) regime is essential. Legal and policy instruments must be designed to recognize communal ownership of IK and ensure that benefits derived from its commercial use are equitably shared with local communities. This calls for legislative reforms and institutional capacity building in IP management that is sensitive to the unique nature of IK systems.

National and County governments should invest in ICT infrastructure, particularly in underserved regions, to facilitate the documentation, digitization, and dissemination of IK. Digital platforms can be used to archive traditional knowledge, enable community-driven innovation, and create e-learning modules that bridge IK and contemporary scientific learning.

Education systems, especially in the STEM disciplines, must also be reformed to include IK. Curriculum development should incorporate IK-based case studies, methodologies, and worldviews to enrich science education and enhance students' capacity for localized problem- solving. This will foster greater respect for cultural diversity while strengthening the relevance of education to Kenyan socio-economic realities.

CONCLUSION

Integrating IKS into the national and local STI ecosystems is a strategic approach to enhance innovation, sustainability, and resilience leading to more inclusive and effective solutions to the pressing challenges of our time. Addressing issues such as lack of clear mandates, inadequate infrastructure, and overlapping responsibilities is crucial for the effective implementation of available laws and initiatives. Strengthening institutional frameworks, providing incentives for community involvement, and ensuring clear guidelines for stakeholder engagement can enhance the protection of Kenya's cultural heritage and the growth of its natural products industry.

Call to Action

Government: To Accelerate policy reforms to embed IK into STI planning and funding frameworks at both national and county levels.

Academia and Research Institutions: To collaborate with communities to validate and upscale indigenous innovations, ensuring ethical and equitable partnerships.

Private Sector: To invest in culturally driven tech innovation, and partner with communities to create inclusive value chains based on IK assets.

Communities and Youth: To take ownership of IK preservation and innovation by participating in training, documentation, and local innovation initiatives.

Development Partners: To provide technical and financial support to scale up the IK DoDi model and integrate it into broader STI and development agendas.

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