Harnessing Traditional Knowledge Holders'
Institutions in Realising Sustainable Development
Goals in Kenya: Francis Kariuki

(2021) Journalofcmsd Volume 6(1))

Harnessing Traditional Knowledge Holders' Institutions in Realising Sustainable Development Goals in Kenya

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Abstract

The paper examines the role of traditional knowledge (TK) holders' institutions in the realisation of components of Sustainable Development Goals (SDGs)-9 and 16. Using two case studies, from the kaya elders (Mijikenda community) and Mbeere traditional potters, the study found that TK holders' institutions are essential, and can play pivotal roles in attaining aspects of the said SDGs. As key drivers of, and essential governance frameworks for innovation, they contribute to the creation, diffusion and application of innovation (a component of SDG 9); while the innovation they generate continues to replenish and strengthen them. Additionally, their role in promoting peace and justice, and an inclusive and practical approach to gender means that they can be instrumental in strengthening formal institutions, especially the intellectual property (IP) institutions (a component of SDG 16). As data repositories and governance frameworks, they have an impact on the prevalence, type and nature of entrepreneurial activities that TK holders can engage in.

Keywords: Traditional knowledge holders' institutions, sustainable development goals, traditional knowledge, traditional knowledge holders' innovation, entrepreneurship, data

1 Introduction

Traditional institutions encompass different types of Indigenous organisations that differ based on their functions such as local governance, community resource mobilisation, security, asset management, conflict resolution, management committees for infrastructure and sector services, among others.

[1] They are complex and multifaceted and have been typologised into land-based, livestock-based, labour-sharing, mutual assistance (social), health, traditional beliefs (including rituals, spiritual leaders & sacred areas), traditional leaders, recreational, and conflict resolution institutions.[2]

The study conceptualises traditional knowledge (TK) holders' institutions[3] broadly, as socially embedded, flexible, legitimate, inclusive and holistic frameworks with regulatory, cognitive and normative dimensions, making them a valuable resource for achieving SDGs.[4] They encompass the laws, customs, traditions, social networks and entities (including councils of elders and certain individuals holding specialised knowledge).

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[1] Paula Donnelly-Roark, Karim Ouedraogo, and Xiao Ye, 2001 'Can local institutions reduce poverty? Rural decentralization in Burkina Faso' *Policy Research Working Paper 2677*, Environmental and Social Development Unit, Africa region (2001) at 3.
[2]Jeremias Mowo, Zenebe Adimassu, Kenneth Masuki, Charles Lyamchai, Joseph Tanui & Delia Catacutan 'The Importance of Local Traditional Institutions in the Management of Natural Resources in the Highlands of Eastern Africa' *Working Paper No 134*, World Agroforestry Centre (2011) at 7-12.
[3]Different terms have been used to describe TK holders' institutions including indigenous, customary, traditional or informal.
[4]Sujai Shivakumar 'The Place of Indigenous Institutions in Constitutional Order' 14(1) (2003) *Constitutional Political Economy* at 10; Elizabeth Watson 'Examining the Potential of Indigenous Institutions for Development' (2003) *Development and Change* at 287-309; and Shirin Elahi, Jeremy de Beer, Dick Kawooya, Chidi Oguamanam & Nagla Rizk, *Knowledge and Innovation in Africa: Scenarios for the Future* (Open AIR, 2013) at 126.

The study focuses on SDGs-9 and 16. SDG-9 deals with industries, innovation, and infrastructure,[5] while SDG-16 focuses on peaceful and inclusive societies, access to justice and the building of strong institutions.[6] The study focuses on SDG-9 because TK holders' institutions have a role in the promotion of innovation. Whereas most studies have focused on the interplay between IP institutions and innovation, there is less focus on the role of TK holders' institutions in promoting innovation. Analyzing TK holders' institutions, will shed light on their role in driving innovation, and addressing institutional barriers (e.g. failure to meet the test of rigidly established industrial standards within IP rights) to the commercialisation of innovations by communities and realisation of their entrepreneurial potential.[7] Moreover, and while IP institutions have been criticised for being gender biased against women innovators and creators,[8] local institutions 'may feature more or less restrictive gender norms' and hence create opportunities for the different groups to participate in, and benefit from innovation processes.[9] The case studies in this work will illuminate on the gender dimension of TK holder's innovation, and the inclusive and practical approach to gender of TK holders' institutions.

Promoting SDG-16 holds the promise for building institutions to promote justice and empower TK holders, most of whom are living in abject poverty yet their TK and associated resources continue to be misappropriated through the IP regime. It, therefore, becomes necessary to evaluate the role of TK holders' institutions in strengthening formal institutions such as the IP institutions. Relatedly, due to the data generated by TK holders' institutions, and their role in driving innovation, they provide a conducive environment for entrepreneurship,

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[5]Available at https://sdg-tracker.org/infrastructure-industrialization, accessed on 16/01/2020.
[6]Available at https://www.un.org/development/desa/disabilities/envision2030-goal16.html, accessed on 16/01/2020.
[7] See Mugabe John 'Intellectual Property Protection and Traditional Knowledge: An Exploration in International Policy Discourse' (2001) at 25.
[8] Ann Bartow 'Fair use and the fairer sex: Gender, feminism, and copyright law' (2006) 14(3) *Journal of Gender, Social Policy & the Law* at 551 – 584.
[9] Patti Petesch, Lone Badstue, Gordon Prain, Marlene Elias & Amare Tegbaru 'Entry points for enabling gender equality in agricultural and environmental innovation' GENNOVATE resources for scientists and research teams (2017) at 5. See Julio Berdegue 'Pro-poor innovation systems' Background Paper, IFAD (2005) at 7.

and determine prevalence, type and nature of entrepreneurship. This is particularly true in Africa where most goods and services are sourced, produced and sold within families or other trusted social networks in a collaborative manner.[10]

Moreover, TK holders' institutions are data repositories and data governance frameworks that can be deployed in designing a strong regime for TK holders' data sovereignty. The data they hold underlies their innovative capacity; strengthens institutions; manages, monitors and mitigates risks; and thus hold the promise for the realisation of the developmental needs and aspirations of TK holders including the attainment of other SDGs such as SDG-15[11] and 13.[12]

The paper has six sections. Section 1 is this introduction that sets out the general outline of the study. Section 2 discusses the methodology. In section 3, the two case studies are discussed to set the research context. The broad conceptual parameters are set out in section 4, where TK holders' institutions are discussed. It then situates TK holders' innovation within the wider framework of innovation. It then discusses TK holders' institutions, and their contribution in strengthening formal institutions such as the IP institutions. Thereafter, the study conceptualises TK holders' institutions, and their role in driving entrepreneurship, and in data governance. Section 5 sets out the findings of the study thematically including the challenges bedevilling the TK holders' institutions while section 6 is the conclusion.

2   Research methodology

The research was a desktop study supplemented by semi-structured interviews and focus group discussions (FGDs) in the two case studies. [13] The Mbeere

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[10] Elahi *et al* op cit note 4 at 95.

[11] SDG-15 requires the protection, restoration and promotion of sustainable use of ecosystems, forests, combat desertification and halt land and biodiversity degradation.

[12] SDG-13 *inter alia*, seeks to strengthen resilience and adaptive capacity to climate-related hazards and natural disasters; and improve education and awareness-rising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

[13] I obtained ethics clearance from the Strathmore University Institutional Ethics Review Committee (SU-IERC) which is one of the accredited institutions by the National Commission for Science, Technology and Innovation (NACOSTI) in Kenya to conduct ethics reviews of research protocols in the human and behavioral sciences.

community was selected because of its traditional pottery practices while the Mijikenda community was selected because of their effective form of traditional management systems of the *kaya* forests (sacred groves). In the Mijikenda case study, I built upon previous research that I carried out as part of my doctoral project in 2018 on the role of traditional institutions in the protection of TK. Through that study, I was able to establish close personal, professional relations and mutual trust with the community, allowing easy access to information. Thus, it was easy to identify the respondents to participate in the interviews and FGDs.

The findings are based on 25 interviews conducted in the 2 case studies mainly with TK holders' representatives, researchers, civil society organisations (CSOs) and government agencies. I contacted some of the interviewees via phone especially those from CSOs and government agencies that I had interviewed previously in the course of the doctoral project. The interviews were conducted between 14/10/2019 and 05/11/2019. Among the Mijikenda, I interviewed 15 people. 10 of the interviews were *kaya* elders, 2 members of CSOs working in the area (Community Action for Nature Conservation (CANCO), and Trust for Indigenous Culture and Health (TICAH)), and 3 government representatives (Kenya Forest Service (KFS), Coastal Forest Conservation Unit (CFCU) and Kenya Resource Center for Indigenous Knowledge (KENRIK) based at the National Museum of Kenya (NMK).

In the Mbeere case study, I interviewed 10 people. Majority of the interviewees were women involved in pottery (6) and 4 from CSOs (African Biodiversity Network (ABN) and the Institute for Culture and Health (ICE). The length of the semi-structured interviews ranged from 30 minutes to one hour and 15 minutes, on average lasting approximately 45 minutes, where questions focused on the role of TK holders' institutions in the promotion of innovation and building of strong institutions. Both closed and open-ended questions were used to ensure comprehensive coverage of the issues, and to minimise the disadvantages arising from using only one form of questioning, while maximising the advantages of each. The interviews allowed respondents to express views in their own terms and in detail. Purposive selection was used to identify the key informants.

To complement the interviews and to verify some of the claims made during the interviews, 2 FGDs were organised with key informants identified during the

interview process. One in Kaloleni in Kilifi on 4 November 2019 for the *kaya* elders, and another in Ishiara on 12 November 2019 for the Mbeere. Each of the FGDs lasted approximately 45 minutes. There were 15 people in the Mijikenda FGD comprising mostly *kaya* elders, community members, county forest guards, representatives from National Museum of Kenya (NMK), and the Coastal Forest Conservation Unit (CFCU). In the Mbeere case study, the FGD comprised of 10 potters since there are currently no efforts by government or CSOs to support the potters. The purpose of the FGDs was to obtain information from informants on how TK holders' institutions can be harnessed to realise innovation and strengthen institutions. Moreover, through the FGDs, the researcher gained insights into the data that TK holders' institutions generate, their role in data governance and entrepreneurship.

The interviews, FGDs and literature review were structured so as to answer the following questions. What are the existing TK holders' institutions with the potential to contribute to innovation and strong institutions in Kenya? How can TK holders' institutions be harnessed in the realisation of innovation and strong institutions in Kenya? What role do women play in driving innovation, and in relation to TK holders' institutions? What data do TK holders' institutions generate and how does the said data strengthen those institutions and innovation, and thus boost the SDGs? And what role can TK holders' institutions play in data governance to engender transformational entrepreneurial potential for TK holders?

The qualitative data gathered from the semi-structured interviews and FGDs was analysed using a thematic deductive analysis approach. This approach aided in the identification of themes and interpretation of information. The interviews were recorded and transcribed, while notes were taken from the FGDs. Transcripts were reviewed and systematically coded using a coding grid. The common codes in the grid were then interlinked to highlight similarities and differences within and between the codes. Selected codes were consolidated and given a descriptive label in order to reflect a specific theme bearing in mind the research questions. The themes were then reviewed and refined to eliminate coding redundancies, and to ensure the data is accurately portrayed. Thereafter, the themes were defined, named and those reflecting a similar idea merged into global themes, and inserted in a column within the coding grid. Interpretation

was done by identifying and examining the underlying ideas, assumptions, conceptualisations and ideologies that shape or inform the data, bearing in mind the research questions. Lastly, the research project was written up in a way that illustrates the trustworthiness and validity of the results, relating analytically the experiences from the three case studies, and linking them to relevant literature. The broad themes that rose from the data are: existence and nature of TK holders' institutions and the roles of TK holders' institutions in: innovation, building strong institutions, entrepreneurship and data governance.

3   Research context

The Mijikenda, *kaya* elders and their TK practices
The first case study relates to the *kaya* forests, the sacred forests of the Mijikenda, a Bantu-speaking people consisting of nine sub-communities namely: the *Chonyi, Digo, Duruma, Giriama, Jibana, Kambe, Kauma, Rabai* and *Ribe* who are closely related linguistically and culturally.[14] The name Mijikenda is a Swahili derivative from the expression *midzi chenda* (nine homes) referring to the nine constituent sub-communities. According to historians, the Mijikenda migrated into the coastal area in the 16th century or earlier from a northern homeland known as Singwaya or Shungwaya.[15] When they migrated into Kenya, they settled in fortified hilltop villages known as *kaya* (meaning a settlement, village or home) as they were at risk of attack from other communities.[16] Each Mijikenda sub-community has its own *kaya*, which is a political institution and a settlement with a closely-knit society controlled by a council of elders, the *kambi* or *ngambi*.[17] Each *kaya* has its own history, committee of elders, and set of environmental and socio-cultural circumstances; but there are common themes traceable amongst them.[18] Currently, there are about 60 *kaya* forests,

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[14] Paul Ongugo, Doris Mutta, Mohamed Pakia & Peter Munyi 'Protecting Traditional Health Knowledge in Kenya: The role of customary laws and practices' International Institute for Environment and Development (2012) at 4.

[15] James de V. Azzen & Jim Allen 'Shungwaya, the Mijikenda, and the Traditions' (1983) 16(3) *The International Journal of African Historical Studies*, 455-485 at 455.

[16] Celia Nyamweru 'Sacred Groves and Environmental Conservation' (1998) *The 1998 Frank P. Pistor Faculty Lecture*, 1-27 at 9.

[17] Ongugo *et al* op cit note 14 at 4.

[18] Celia Nyamweru 'Report on Socio-Cultural Research carried out in Kwale and Kilifi Districts of Kenyan' unpublished manuscript, at 12 (a copy in the researcher's file).

covering an area of about 4,000 acres and representing 'some of the few patches of undisturbed vegetation in an increasingly densely-populated landscape.'[19] Today, the Mijikenda are found in Kilifi, Kwale and Mombasa counties. There are however no *kayas* in Mombasa County. Kwale County is home to the Digo and Duruma sub-communities while Kilifi County has the other 7 Mijikenda sub-communities. The study focused on Kilifi County since it has some of the best-managed *kayas* and there is strong adherence to cultural traditions. Moreover, most of the Kilifi *kayas* are on the World Heritage listing whereas in Kwale it is only the Duruma *kayas* that are listed.

Figure 1: An image of *kaya* Kauma in Kilifi County. It is listed as a World Heritage Site.

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[19] Nyamweru (1998) op cit note 16 at 15.

Figure 2: An image of *kaya* Kambe in Kilifi County. It is also listed as a World Heritage Site.

Over time, the *kaya* elders have developed a system for protecting their TK and forests. Under that system, the elders are viewed as custodians, with the responsibility for regulating access, use and control of resources (including TK) in accordance with customary laws (including rites and taboos) and enforcing them. Through taboos, for instance, they regulate who can access the forests, when, how and for what reasons. For example, it is a taboo to enter; bring flames; fence; or cut trees in the *kaya* without the consent of the elders.[20]

Moreover, TK is held at the individual, family/clan or community levels. Individuals may hold specialised knowledge on the use of specific plants and carving of *vigango* (memorial statues erected on tombs), which means it is their prerogative to share it.[21] TK relating to spiritual healing is viewed as family/clan

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[20] Interview with an environmental scientist working with the CFCU at Kilifi on 05/11/2019. Some trees are sacred, and are believed to be the abode or shelter of ancestral spirits as well as the secret objects of the community and cannot be harvested.
[21] Interview with an environmental scientist working with the CFCU at Kilifi on 05/11/2019.

property, and is selectively inherited either before or after the life of a practising healer, or spiritually guided, where a selected heir falls sick until he takes up the practice.[22] At the community level, certain rituals/ceremonies are conducted by initiated elders for community benefit including: prayers in times of drought or famine; cleansing of land; thanksgiving prayers and blessing of the harvest; prayers for healing community members; prayers for peace; and divination.[23]

Apart from holding TK, and conserving the *kaya* forests, the elders play a key role in promoting unity, conflict resolution, rule-making, and enforcement of those rules.[24] The elders and forests are a symbol of unity and cultural identity for the Mijikenda people.[25] Moreover, elders are the first port of call wherever there are disputes (including land, family and political) in the community. Further, local politicians, must seek the blessings of the *kaya* elders, before venturing into politics, illustrating their acceptance and legitimacy.[26]

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[22] Ongugo *et al* op cit note 14 at 13-14.

[23] A meeting with *kaya* elders at Kaloleni on 04/11/2019.

[24] Ibid.

[25] Celia Nyamweru & Elias Kimaru 'The contribution of ecotourism to the conservation of natural sacred sites: A case study from coastal Kenya' (2008) 2(3) *JSRNC*, 327-350 at 328.

[26] A meeting with *kaya* elders at Kaloleni on 04/11/2019.

Figure 3: The researcher (holding a cap) attended a customary court session on 26th April 2018 at *Mwembe Marunga* where Rabai elders sit (under a mango tree) to hear and determine disputes touching on land, adultery, witchcraft, marital and family disputes every Monday and Wednesday among locals.

There are collaborations between *kaya* elders and governmental and non-governmental agencies to protect their TK and resources.[27] For example, some *kaya* forests are World Heritage Sites[28] and are under the management of the

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[27] Ibid.

[28] For example, *kaya* Mudzimwiru, Mudzimuvya and Bomu-Fimboni; Fungo, Kambe, Kauma, Ribe, Kinondo and Jibana.

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NMK and the stewardship of United Nations Educational, Scientific and Cultural Organisation (UNESCO). Additionally, NMK in collaboration with UNESCO and the State Department of Culture runs a program aimed at recognising the intangible cultural heritage (ICH) in the *kayas* and the recognition of secondary *kayas*, in need of urgent protection from extinction.[29] Moreover, CFCU is working with *kaya* elders to sensitise the youth on the cultural and ecological value of forests (through essay competitions, visits to schools, and field trips); strengthen traditional institutions; support elders in fencing some forests; and recruit guards to monitor the forests and report any infraction of regulations to the elders.[30] Similarly, the County Government of Kilifi, has established the County Forest Guards who work with elders to prevent encroachment into the forests. TICAH, a local NGO, has a program on TK and culture, where it is working with elders to document their TK, rituals and traditions. In particular, TICAH is working to document and commercialise TK relating to medicine.[31]

The Mbeere and their traditional pottery practices
This study focused on pottery among the Mbeere people, in Ishiara area. Ishiara is famous for traditional pottery, and has a market for pots. Pottery is done by women (mothers and grandmothers) who pass on those skills to their daughters as they grow up. They practise pottery on a part-time basis and seasonally since most potting takes place during the dry season (August) after harvesting, when the potters have time to spare. Thus, pottery helps women supplement their income, and mitigate against food shortages in their families.[32]

The pots are used for various purposes such as cooking vessels, as hearths, *jiko* (cooker) linings, storage equipment and flower vases. Food prepared using the pots is tastier than that prepared using aluminium vessels.[33] Moreover, the pores in the clay helps filter dirt from water hence making it relatively clean and safe for drinking. Additionally, since Mbeere is an arid and semi-arid area, and temperatures can rise upto 40 degrees, the community uses the pots to cool

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[29] Interview with an environmental scientist working with the CFCU at Kilifi on 05/11/2019.
[30] Nyamweru (1998) op cit note 16 at 23.
[31] Available at https://www.ticahealth.org/indigenous-knowledge-culture/indigenous-knowledge-culture/ accessed on 16/01/2020.
[32] Workshop with traditional potters in Ishiara held on 13/11/2019.
[33] Ibid.

drinking water. Further, the pots retain more heat than normal cooking pots thus conserving firewood.[34]

Pottery making goes through the following processes: procurement of raw materials, preparation of the clay, forming the vessels, surface treatment, decoration, drying and firing.[35] The raw materials used are red-brown clay (from a place called *Cianthugi)*, water and fire. Potters prefer clay derived from weathered rocks as it has small particle sizes and plate-like characteristics, and other chemical properties that allow it to be worked into shape and baked, to create the vessels.[36] Preparation of the clay entails removing any organic and inorganic impurities which may crack the pot while drying. It is then finely ground, mixed with water and treaded before kneading to improve plasticity and remove air bubbles. Thereafter, the process of forming/shaping the pots begins, which entails coming up with flattened coils out of the kneaded clay that are joined together to form a circular structure as shown in Figure 4 below. Surface treatment/finishing helps to remove impurities/marks left while forming/shaping the pot such as finger depressions.[37]

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[34] Ibid.

[35] Rosemary Wangari 'An ethnoarchaeological study of pottery in Evurore division, Mbeere North District, Embu county, Kenya' Master of Arts Thesis, Kenyatta University (2013) at 35.
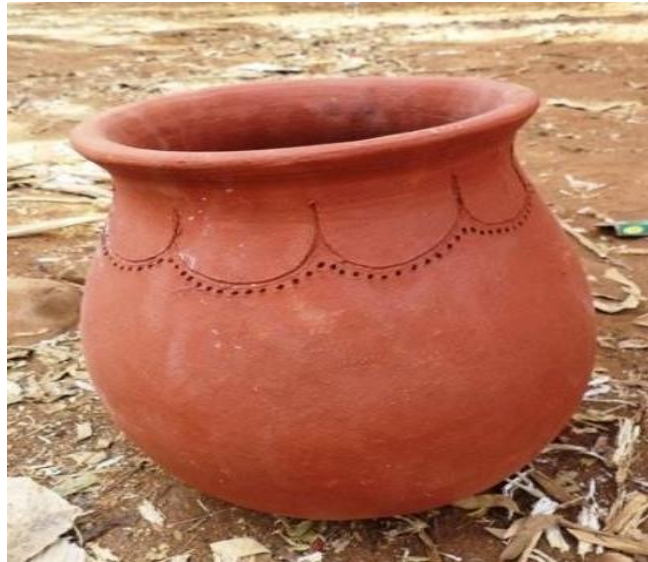
[36] Ibid at 36.

[37] Ibid.

Figure 4: a potter engaged in pot forming

Where decorations are necessary, they are incised using a piece of stick or a broken piece of calabash. The decorations consist of simple horizontal rows of dots/lines, grooved horizontal zigzag or wavy lines confined to or just below the neck of the pot.[38] Decorations are also applied using different colours especially for pots meant for use as flower vases, see Figures 7 and 8 below.

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[38] Ibid.

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Figure 5: grooves and dots decorations

Figure 6: Zigzag line decoration on a pot

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Figure 7: A flower vase decorated using black and white colour paint

Figure 8: Colour decorations on a pot meant for use either as a flower vase or a house decoration

Thereafter, the vessel is dried under a shade, away from direct sunlight for about 5 days to remove water that is mechanically combined with clay particles.[39] Direct sunlight is avoided since rapid drying due to high temperatures can cause cracks. After the initial drying, the pot is dried directly under the sun. The duration for direct drying varies depending on the size and relative humidity. When dry, the pots are baked hard by firing them under high temperatures. To ensure even and/or controlled firing, firing is usually done late in the evening when the wind is not blowing. Thereafter, they allow the pots to cool before pulling them out from the fire using tongs thus preventing cracking through rapid

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[39] Workshop with traditional potters in Ishiara held on 13/11/2019.

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heat loss. Once ready, the women hawk the pots around the village or take them to Ishiara market.[40]

Figure 9: Pots for sale at Ishiara market

The vessels may also have different shapes. There are wide-mouthed pots (mostly for cooking); narrow-mouthed (for storing water and grains); and with varying basal shapes-flat bases (used as flower vases) and rounded/cylindrical bases (for cooking).[41]

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[40] Ibid.
[41] Ibid.

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Figure 10: wide-mouthed pots

Figure 11: pots with a rounded or cylindrical bases

4 Conceptual context

4.1 TK holders' institutions

TK holders' institutions are complex, multifaceted governance frameworks that deal with diverse subject matters, depending on their functions, to wit: land, livestock, labour-sharing, mutual assistance (social), health, traditional beliefs (including rituals, spiritual leaders & sacred areas), traditional leadership,

recreational, and conflict resolution.[42] They include customary laws and practices; family secrets; oral agreements; sharing mechanisms; community sanctions; trust; and ostracism.[43] They have remained resilient, and enjoy popular legitimacy because of their 'proximity and intimate familiarity with their communities' which makes them 'more effective in adjudicating disputes, allocating land, and advocating for their constituents than many MPs, local councillors, and state institutions.'[44] The legitimacy also stems from the fact that they function according to cultural norms which people are deeply familiar with, thus facilitating both access and (non-electoral) accountability,[45] especially where formal state institutions have failed or had limited access. This is in consonance with studies suggesting that 'successful engagement with rural communities should start with recognizing that they have institutions through which they can practise or organize collective action.'[46] A study conducted on the Mijikenda, confirms that 'respect for the indigenous institutions remains strong' in the community.[47]

As governance frameworks for TK and natural resources, and data repositories (holding knowledge, social networks, ethos, values, methods of utilising resources and conservation etc.).[48] They are also custodial institutions that aim at 'the continuous use and preservation of the place, its values, and its

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[42] Mowo *et al* op cit note 2 at 111.

[43] Jeremy de Beer & Sacha Wunsch-Vincent 'Appropriation and Intellectual Property in the Informal Economy' in Erica Kraemer-Mbula & Sacha Wunsch-Vincent (eds.) *The Informal Economy in Developing Nations-Hidden engine of innovation?* (Cambridge University Press, 2016) at 243; see also Nagla Rizk, Ayah El Said, Nadine Weheba & Jeremy de Beer 'Towards an Alternative Assessment of Innovation in Africa' OpenAir, *Working Paper 10* (2018) at 40.

[44] Carolyn Logan 'The roots of resilience: Exploring popular support for African traditional authorities' (2013) 112(448) *African Affairs,* 353-376 at 358.

[45] Ibid; Judith Kamoto, Graham Clarkson, Peter Dorward & Derek Shepherd 'Doing more harm than good? Community based natural resource management and the neglect of local institutions in policy development' (2013) 35 *Land Use Policy* at 293–301 at 293; see also Heidi Wittmer, Felix Rauschmayer & Bernd Klauer 'How to select instruments for the resolution of environmental conflicts?' (2006) 23 *Land Use Policy*, 1–9 at 4.

[46] Mowo *et al* op cit note 2 at 2.

[47] Nyamweru & Kimaru op cit note 25 at 327-350.

[48] Shivakumar op cit note 4 at 6.

surrounding environment, including the preservation of its symbolic and cosmological significance.'[49]

TK holders' institutions generate social capital-binding and bridging social capital-that is considered 'an additional factor of production.'[50] Social capital (social norms, relationships and networks) can be mobilized to address societal challenges, create positive synergies, and ensure efficient use of resources since 'people who share a common background, language, culture, and customs' are able to mobilise resources effectively.[51] Social networks allow the formation of linkages between local knowledge and formal sciences that can have positive impacts in society.[52]

Withal, local institutions have been conceptualized within a broader set of theories of institutions, where the aim is to 'get institutions right' and/or strengthen institutions.[53] This approach is informed by various factors. First, there is a prevailing view that good governance, strong and accountable institutions are crucial for poverty reduction and development effectiveness.[54] Second, the massive failure of formal state institutions to project their authority,

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[49] Ibid at 107.

[50] Moina Rauf 'Innovations and informal institutions: An institutionalist approach to the role of social capital for innovation' (2009) *Journal of Academic Research in Economics* at 34.

[51] Ibid. See Donnelly-Roark *et al* op cit note 1 at 4.

[52] Maria-Constanza Torri & Julie Laplante 'Enhancing innovation between scientific and indigenous knowledge: pioneer NGOs in India' 5(29) (2009) *Journal of ethnobiology and ethnomedicine* at 1. See Peter Drahos & Susy Frankel 'Indigenous peoples' innovation and intellectual property: The issues' in Peter Drahos & Susy Frankel (eds.) *Indigenous peoples' innovation: Intellectual Property Pathways to Development* (ANU Press, 2012) at 4.

[53] Watson op cit note 4 at 290; Frances Cleaver 'Moral Ecological Rationality, Institutions and the Management of Common Property Resources' 31(2) (2000) *Development and Change* at 361-383; and World Bank *World Development Report 2002: Building Institutions for Markets* (Oxford Press, 2002).

[54] International Development Association (IDA) 'IDA at Work: Building Strong Institutions for Sustained Results' available at
https://ida.worldbank.org/sites/default/files/pdfs/ida-at-work-building-strong-institutions.pdf accessed on 16/01/2020.

especially in rural contexts, has produced a development agenda fixated on building institutional capacity.[55]

Consequently, the inordinate focus on formal institutions, for instance, in the context of TK protection, means that great efforts have been dedicated towards harnessing the IP regime to protect TK rather than on TK holders' institutions. Moreover, overemphasis on formal institutions, has resulted in a negative attitude towards traditional institutions. They have been highly criticised, *inter alia,* for being prone to manipulation by powerful forces in the community, gender bias, and abuse of power.[56] Such criticism, for instance that the institutions have a gender bias, is at times misplaced, since as this study shows, the roles of men and women are clearly recognised in those institutions. This limits the extent to which they can be deployed in encouraging innovation, building strong institutions and promoting entrepreneurship.

Despite the focus on formal institutions, the use of some of those institutions, like the IP regime to protect TK holders' innovations, faces certain technical and practical challenges. For instance, TK and TK based innovation may not meet the necessary criteria for IP protection. Besides, the sort of exclusive rights granted through formal IP protection cannot offer the necessary protection and appropriation to TK holders' innovations, which are mostly developed collectively. In the TK context, non-pecuniary incentives (intrinsic motivation) plays a considerable role in driving innovative behaviour unlike with IP where the 'prospects of exclusivity and financial rewards' are the main incentives.[57] Further, the use of the IP system by TK holders is constrained by low levels of awareness of IP, challenges in accessing IP protection measures, lack of technical expertise/personnel and financial resources, low investments in R&D,

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[55] McKenzie Johnson 'Strong Institutions in Weak States: Institution Building, Natural Resource Governance, and
Conflict in Ghana and Sierra Leone' PhD thesis, Duke University (2017) at 12. See also Mamadou Dia *Africa's Management in the 1990s and Beyond: Reconciling Indigenous and Transplanted Institutions* (World Bank, 1996).
[56] Ashish Aggarwal 'Indigenous Institutions for Natural Resource Management: Potential and Threats' 43(23) (2008) *Economic & Political Weekly*, 21-24 at 23.
[57] Beer & Wunsch-Vincent op cit note 43 at 242.

high cost of filing and challenging enforcement, and inadequate administrative infrastructure.[58]

Nonetheless, TK holders' can, for instance, use the IP system (such as patent, trademark, geographical indications, or trade secret or confidential information) to: protect their innovation against unauthorised usage of protected IP by competitors; help commercialise IP-protected products and services; help license inventions and create corresponding technology markets; increase brand-based enterprise recognition; signal to potential venture capital to obtain business finance; limit the right of employees to enter employment with competitors; ensure that information is kept confidential; ensure the transfer of rights related to inventions from employees to companies; and facilitate sharing of rights in the results of cooperative projects in a manner that satisfies all contracting parties.[59] Indeed, IP becomes more important as interaction between the informal and formal sectors for joint collaborative innovation increases.[60] Sometimes, too, innovation in the informal sector occurs with the help of formal sector scientific institutions, and vice versa[61] hence the need for the much-developed IP system in protecting the ensuing innovation.

4.2 TK holders' institutions and innovation
An innovation is defined as 'the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations.'[62] In this context, innovative activities include 'the acquisition of machinery, equipment, software and licenses, engineering and development work, design, training, marketing and R&D where undertaken to develop and/or implement a product or process innovation.'[63] The motivation for innovation

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[58] Ibid at 237.
[59] Ibid at 236.
[60] Ibid at 240.
[61] Jeremy de Beer, Kun Fu & Sacha Wunsch-Vincent 'Innovation in the informal economy' in Erica Kraemer-Mbula & Sacha Wunsch-Vincent (eds.) *The Informal Economy in Developing Nations-Hidden engine of innovation?* (Cambridge University Press, 2016) at 73.
[62] OECD & Eurostat, *Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data* (Paris: OECD Publications, 2005) at 46.
[63] Ibid.

includes the desire to increase market share, enter new markets, improve product range, increase the capacity to produce new goods, reduce costs and so on.[64] In the formal sector, markets are recognised as one of the main drivers of innovation. In the context of TK holders, formal markets may not exist,[65] as communities might be interested in non-market transactions such as sharing a product rather than taking it to the market to increase market share.

Institutions play a key role in driving innovations, and are one of the five building blocks of innovation systems.[66] Institutions determine the speed, magnitude and quality of innovation processes,[67] manage uncertainty, provide information, manage conflicts, promote trust among groups, diffuse innovations, and mediate distributional effects of innovation processes related to social class, gender, age, ethnicity, or political power.[68] They also provide incentives for learning, knowledge and innovation production.[69]

TK holders' institutions play a critical role in driving TK holders' innovation and innovation processes. TK holders' innovations are part of, and are a by-product of TK since TK entails 'knowledge, know-how, innovations, skills and practices'[70] of local communities. Indeed, the innovation process has been conceptualized as one where 'knowledge' is both 'an input and output' since

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[64] Jacques Charmes, Fred Gault & Sacha Wunsch-Vincent 'Formulating an Agenda for the Measurement of Innovation in the Informal Economy' in Erica Kraemer-Mbula & Sacha Wunsch-Vincent (eds.) *The Informal Economy in Developing Nations-Hidden engine of innovation?* (Cambridge University Press, 2016) at 338; see also Beer *et al* op cit note 61 at 54.

[65] Luiz Carlos Beduschi, Raúl Contreras & Raúl Holz 'Innovation for sustainable rural development' FAO (2017) at 2.

[66] The others are a regulatory and policy framework; entrepreneurial ecosystem and access to finance; human capital; and technical and R&D infrastructure. See UNCTAD 'Technology and Innovation Report 2018-Harnessing frontier technologies for sustainable development' (2018) at 55.

[67] Berdegue op cit note 18 at 6.

[68] Ibid at 7.

[69] UNCTAD 'Technology and Innovation Report 2018' op cit note 66 at 56.

[70] Oguamanam Chidi 'Tiered or Differentiated Approach to Traditional Knowledge and Traditional Cultural Expressions: The Evolution of a Concept,' CIGI Papers No. 185 (2018) at 5; see also Article 8(j), *Convention on Biological Diversity*, 1760 UNTS 79 (1992).

innovations 'reflect the introduction of a new combination of existing knowledge into the economy, and the innovation itself represents new knowledge.'[71]

Social capital among TK holders' spurs and enhances innovation[72] by facilitating access to resources (contacts, markets, credit and diverse domains of knowledge), and plays a critical role not only in the generation and diffusion of innovation.[73] Bridging social capital allows TK holders to increase their innovative capacity, meet social goals and expand institutional networks at local level and beyond, as they interact with actors such as financial institutions, development agencies, political elites in the community, and technical experts (including researchers and extension staff) in order to advance their innovation processes.[74] Hence, their institutions are useful in bridging the gap between the formal and informal institutions. Conversely, innovation processes contribute to building social capital, both bonding capital (intra-group) and bridging capital (inter-group) within local communities.

Indeed, what makes social capital a vital ingredient to the innovative process is the fact that it 'reduces certain costs like information sharing, transaction costs and enforcement costs and this leaves many resources available for use for innovation-related expenditure.'[75] In rural areas, the diffusion of innovation can greatly benefit from the involvement of women since they play a central role in building social networks that are the main media through which new products or services, commercial or otherwise, are proposed, deliberated and accepted or rejected.[76] However, in the context of small firms, strong social capital could be a liability as well as an asset. Sometimes, dense networks might inhibit 'innovative practices and new ideas' while other times absence of ties is said to

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[71] See Erica Kraemer-Mbula & Sacha Wunsch-Vincent (eds.) *The Informal Economy in Developing Nations-Hidden engine of innovation?* (Cambridge University Press, 2016) at xxvi.
[72] Drahos & Frankel op cit note 52 at 16-18. Torri & Laplante op cit note 52 at 1.
[73] Rauf op cit note 50.
[74] Ibid at 1; Stephen Oluwatobi, Uchenna Efobi, Isaiah Olurinola & Philip Alege 'Innovation in Africa: why institutions matter?' (2015) *South African Journal of Economics* at 2; see also Torri & Laplante op cit note 52 at 1.
[75] Ibid at 36.
[76] UNCTAD 'Pro-poor technology, innovation and entrepreneurship policies' UNCTAD/B/C. II/MEM.1/12, Geneva, 16-18 January 2012 at 11.

promote the generation of new ideas and knowledge. Weak ties may also play an important role in bridging the gap between the formal and informal institutions.[77] However, with TK holders' institutions, the existence of dense networks might not inhibit innovation since there are customary laws that act as normative frameworks, governing the rights and obligations of community members at the individual, clan, family and community levels.

Studies suggest that innovation is occurring in the informal economy[78] 'in a new set of under-studied contexts',[79] some of which are relevant to TK holders. One of these contexts is innovation in community-based settings, such as homes, villages, craft workshops and among informal and semi-formal networks.[80] Innovation activities in these contexts are 'extremely diverse, as are the sources of knowledge, learning and innovation that shape and diffuse them.'[81] Those innovations are described variously as grassroots, informal, rural, pro-poor, frugal or *jugaad,* local, social, endogenous innovation.[82] A discussion of all these innovations is clearly beyond the scope of this study. However, some of these forms of innovation are relevant to TK holders' innovation, as they tend to go beyond enterprise innovation and typical firm incentives to innovate (such as increased revenue and market share).[83] Moreover, such innovations incorporate knowledge domains beyond science, engineering and technology, by paying more attention to innovation metrics that capture spontaneous, process-based,

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[77] Rauf op cit note 50.

[78] See generally, Beer & Wunsch-Vincent op cit note 43; Oluwatobi *et al* op cit note 74; Torri & Laplante op cit note 52 at 2.

[79] Elizabeth Hoffecker, 'Local Innovation: what it is and why it matters for developing economies' Working Paper 01, May 2018 at 2; see also Beer *et al* op cit note 61.

[80]The other context is within peer-to-peer networks of product users (also described as open, horizontal or user innovation. Open innovation 'transcends organization and locational boundaries, relying instead on digital connectivity to link participants in the innovation process across disparate locales', Hoffecker op cit note 79.

[81] Beer *et al* op cit note 61 at 63.

[82] See generally Berdegue op cit note 9 at 9.; UNCTAD 'Pro-poor technology, innovation and entrepreneurship policies' UNCTAD/B/C. II/MEM.1/12, Geneva, 16-18 January 2012; Hoffecker op cit note 79; Britta Rutert and Cath Traynor 'Complexities of Social Innovation and Social Entrepreneurship by Two Indigenous Organisations in Rural South Africa' Open Air, Working Paper 20 (2019).

[83] Charmes *et al* op cit note 64 at 345.

and needs-driven innovations on the demand-side of the economy,[84] as discussed below.

Social innovation refers to innovations and processes of innovation that are social in nature (such as networking, collaboration, group formation, organisational governance and management practices), that improve a society's ability to create opportunities for investment, growth and development.[85] Social innovation recognises that innovations can emerge through self-organisation, self-empowerment and development,[86] making it particularly relevant to TK holders who have unique institutions for self-governance, and who hold their TK collectively, and at times for certain social purposes, such as environmental conservation. Pro-poor innovation is relevant to TK holders due to their poor social and economic conditions. Inclusive innovation, *inter alia*, seeks to, ensure the inclusion of all the necessary stakeholders (including the excluded population) in the design, development, and in defining the problems and solutions that an innovation seeks to address.[87] Therefore, inclusive innovation is apposite to TK holders, and women as it eschews the exclusionary nature of conventional innovation where big firms 'produce innovations that are associated with inequality', and that have little connection to low-income populations.[88]

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[84] Rizk *et al* op cit note 43 at 4.

[85] Bureau of European Policy Advisers (BEPA) 'Empowering People, Driving Change: Social Innovation in the European Union' (European Communities, 2011); Geoff Mulgan, Simon Tucker, Rushanara Ali, and Ben Sanders 'Social Innovation: What it is, Why it Matters, and How it can be Accelerated' Skoll Centre for Social Entrepreneurship, Working Paper (2007) at 8-10.

[86] Rutert & Traynor op cit note 82 at 5.

[87] Jussi Jauhiainen and Lauri Hooli, 'Indigenous Knowledge and Developing Countries' Innovation Systems: The Case of Namibia,' 1(1) (2017) *International Journal of Innovation Studies* 89-106 at 92. See Charmes *et al* op cit note 64 at 345.

[88] Richard Heeks, Mirta Amalia, Robert Kintu & Nishant Shah 'Inclusive Innovation: Definition, Conceptualisation and Future Research Priorities' *Manchester Centre for Development Informatics Working Paper* 53 (2013) at 2. See Petesch *et al* op cit note 9 at 1.

Indigenous innovation is rooted in the diverse and distinct cultures of Indigenous peoples' and tied to their long inhabitation in a particular place.[89] Indigenous innovation entails '…cultural autonomy, remembrance and retrieval, self-determination, and community-based values linked with the maintenance, preservation, restoration and revitalisation of indigenous knowledge systems that merge episteme with place and cultural practice.' Each of these aspects are 'continually articulated, debated, redefined, and expanded both within and outside of indigenous communities.'[90] Indigenous innovation develops in response to threats engendered by ecological and cultural challenges,[91] especially at the 'level of systems maintenance, where the systems being maintained are interlocking ecological systems and sub-systems.'[92]

However, TK holders' innovation marks a conceptual departure from the various domains of innovation, highlighted above, in a number of ways. It departs from inclusive innovation, in the sense that, the latter does not specify the 'marginalised' groups that it is concerned with. Indeed, the target group within inclusive innovation, tends to vary in different contexts.[93] TK holders' innovation focuses on TK holders. Local innovation differs from TK holders' innovation in that, with the former, the innovation may not have the necessary linkage to TK, culture, tradition or heritage of the innovators. Moreover, there is also no necessary link between the innovator and the relevant resources (plants and animals) in a cosmological sense. Further, local innovation connotes only context-specific and internal innovation, and is thus conceptually narrower than TK innovation.[94] Hence, TK innovation can be described as local, but local innovation may not necessarily be TK innovation. There are relatively more overlaps between TK and Indigenous innovation than with the other types of innovation. While TK innovation is generally informed by TK, Indigenous innovation is underpinned by Indigenous knowledge (IK). TK is the 'totality of all knowledge and practices' used in the management of socio-economic and

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[89] Elizabeth Sumida Huaman 'Indigenous-Minded Innovation in Shifting Ecologies' in Elizabeth Sumida Huaman & Bharath Sriraman (eds.), *Indigenous Innovation: Universalities and Peculiarities*, (SensePublishers, Rotterdam, 2015) at 1-10.
[90] Ibid at 4.
[91] Ibid at 5.
[92] Drahos & Frankel op cit note 52 at 22.
[93] Heeks *et al* op cit note 88 at 4.
[94] Hoffecker op cit note 79 at 1, 3.

ecological facets of life while IK is the local knowledge unique to a particular culture and society that identifies itself as Indigenous. [95] Nonetheless, TK and IK may also overlap depending on the political context and experiences of the claimants to the knowledge. For instance, the Indigenous people of North America, may describe IK the same way as TK, but their recognition in international law as Indigenous People, has a jurisprudential connotation that ties them to the use of IK, even though they may not support any suggestion that IK is not TK. Thus, TK holders' innovation is broader, and may encompass indigenous innovation. However, there is a convergence between Indigenous and TK innovation in that both are 'place-based' and 'cosmologically linked to land' in the sense that there is a special relationship between the innovators and a place.[96]

However, and for a long time, research and metrics on innovation has focused on innovation within large firms, to the extent that innovation (especially product innovation) is more often equated with R&D[97] expenditures than on informal means such as 'learning-by-doing,' 'learning-by-using,' 'learning on the job,' self-training and apprenticeships.[98] Moreover, conventional innovation metrics value the standardisation of innovation through either IP standards or levels of educational enrolment or attainment, hence inappropriate in investigating the nature, type and extent of TK holders' innovation;[99] which could be uncodified and transmitted transgenerationally.[100] Further, R&D is equated more or less with product innovation-intensive technological breakthroughs or, in IP circles,

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[95] Mugabe op cit note 7 at 3; WIPO 'The Protection of Traditional Knowledge: Outline of Policy Options and Legal Elements' WIPO/GRTKF/IC/7/6, para 17; Republic of Kenya *The National Policy on Traditional Knowledge, Genetic Resources and Traditional Cultural Expressions* (Government of Kenya, 2009) 1.

[96] Drahos & Frankel op cit note 52 at 2.

[97] Beer *et al* op cit note 61 at 53-55; Hoffecker op cit note 79; Drahos & Frankel op cit note 52 at 3; and Asli Kunt, 'What Explains Firm Innovation in Developing Countries?', available at http://blogs.worldbank.org/allaboutfinance/what-explains-firm-innovation-developing-countries, accessed on 30/11/2019.

[98] Rizk *et al* op cit note 43 at 3-4; Michaela Trippl 'Regional Innovation Systems and Knowledge-sourcing Activities in Traditional Industries – Evidence from the Vienna Food Sector' (2011) 43(7) *Environment and Planning A*, 1599-1616 at 1599; Drahos & Frankel op cit note 52 at 18.

[99] Beer *et al* op cit note 61 at 55.see Rizk *et al* op cit note 43 at 21.

[100] Drahos & Frankel op cit note 52 at 18.

patentable inventions,[101] making it insufficient in the context of TK holders' innovations that are place-based, cumulative (limited newness), collectively developed and result from interactions with nature, and not R&D.[102]

Thus, there is lack of comprehensive research outlining a coherent theoretical and practical account of TK innovation. Indeed, Rizk *et al* rightfully opine that TK is not included within the broader definition, and understanding of knowledge and innovation.[103] Consequently, there is a lack of research linking TK holders' institutions and innovation in Africa, more so in the context of the SDGs.

4.3 TK holders' institutions and building of strong institutions
As mentioned earlier, the popularity, legitimacy and resilience of TK holders' institutions means that they still play crucial roles in society. TK holders rely on these institutions in natural resources governance, conflict resolution, in maintenance of law and order, and even politics, as is illustrated in the case studies. This means that they can perform important roles in building and strengthening formal institutions, especially where the latter are weak or non-existent.

Social capital helps TK holders build important linkages, within and beyond the community, including with public and private institutions, which help in strengthening institutions.[104] The ability of TK holders' institutions to generate innovation, provides knowledge and capacity for implementing policy initiatives, and 'fill in the void created by the limited penetration of national institutions' especially 'in the presence of weak state capacity'[105] For instance, with the institutional crisis bedeviling IP institutions in spurring and promoting TK holders' innovation among communities,[106] collaborations between TK holders' and IP institutions can enrich the latter, and address the inadequacy,

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[101] Beer *et al* op cit note 61 at 54.
[102] Trippl op cit note 98 at 1599.
[103] Rizk *et al* op cit note 43 at 8; Watson op cit note 4 at 290; Cleaver op cit note 53; World Bank op cit note 53; and Berdegue op cit note 9 at 3-4.
[104] Torri & Laplante op cit note 52 at 10; see also Rauf op cit note 50 at 37.
[105] Stelios Michalopoulos and Elias Papaioannou 'Pre-colonial Ethnic Institutions and Contemporary African Development' (2013) 81 *Econometrica* at 117.
[106] Beduschi *et al* op cit note 65 at 6.

deficiency and unsuitability of the IP regime in protecting TK. Such collaborations, can break the barrier to scaling up TK holders' innovative activity, for instance, if communities can have some 'exclusive rights' over their innovations, they might develop their businesses beyond a certain stage, and possibly be incentivised to invest in machines or human capital.[107] This is so because, the dynamics of innovation benefits from a system in which all actors (including TK holders and their institutions) in the innovation paradigm work together in a collaborative manner. Such collaborations enhance good governance, inclusivity in innovation and the building of strong institutions from below, as communities participate in the development dialogue.

Moreover, TK holders' institutions are able to address the gender gap and institutional barriers to innovation within the IP regime. For instance, in a study of Zulu women bead-workers, Desmond Oriakhogba demonstrates that through social entrepreneurship and inclusive innovation, rural women crafters are 'getting around the challenges within the IP regimes by developing a community which fosters inclusion, collaboration, knowledge-sharing and continuous learning among themselves.'[108] This way, the women are 'constantly improving and harnessing their indigenous knowledge and empowering themselves to be able to address their personal and shared social challenges of poverty, inadequate health care, housing, access to education for their children, among others.'[109]

4.4 TK holders' institutions and transformative entrepreneurship
UNCTAD identifies the institutional framework, as one of the priority areas in devising an entrepreneurship policy in developing countries. [110] The institutional framework has a strong impact on the type of entrepreneurship that arises, and

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[107] Beer & Wunsch-Vincent op cit note 43 at 255.
[108] Desmond Oriakhogba 'Empowering Rural Women Crafters in KwaZulu-Natal: The dynamics of intellectual property, traditional cultural expressions, innovation and social entrepreneurship' (2020)137 *The South African Law Journal* at 145-172.
[109] Ibid at 145-172.
[110] The others are national entrepreneurship strategy; education and skills; innovation and technology; access to finance; and awareness and networking. See UNCTAD 'UNCTAD Entrepreneurship Policy Framework and its implementation' (2013) available at https://unctad.org/en/Pages/DIAE/Entrepreneurship/EPF-4.aspx accessed on 02/01/2020.

its broader societal impact, including its contribution to structural transformation.[111]

TK holders' institutions contain data that has a decisive impact on the prevalence, type and nature of entrepreneurial activities[112] that TK holders can engage in. The data also assists in determining if, how, and under what conditions community members can access available resources such as knowledge to generate output, skills, innovation, labour, finance etc.[113]

Social capital enables TK holders access vital contacts, resources (markets, credit, and diverse domains of knowledge) and information by linking them to other social and economic agents, within the community and beyond, whose capabilities could boost entrepreneurship.[114] Conversely, the new actors (entrepreneurs) provide the necessary resources needed in the innovation process such as tools, production equipment, access to seed capital and grant funds for innovation development.[115] Thus, while spurring innovation, TK holders' institutions also enhance and promote their entrepreneurial spirit. [116]

Successful entrepreneurship is also seen as 'a cooperative endeavour, mediated by social networks' rather than 'a purely individualistic and competitive' effort.[117] Consequently, the environment within which entrepreneurship takes place impacts its nature and success. Rutert and Traynor show in their research

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[111] UNCTAD 'The Least Developed Countries Report 2018- Entrepreneurship for structural transformation: Beyond business as usual' (2018) at 14.

[112] Niels Bosma, Jeroen Content, Mark Sanders & Erik Stam 'Institutions, Entrepreneurship, and Economic Growth in Europe' 51(2) (2018) *Small Business Economics* at 483.

[113] Ibid; see also Brendan Tobin 'Bridging the Nagoya Compliance Gap: The Fundamental Role of Customary Law in Protection of Indigenous Peoples' Resource and Knowledge Rights' (2013) 9(2) *Law Environment and Development Journal,* 142-162 at 151-153.

[114] Beduschi *et al* op cit note 65 at 3; see also Mowo *et al* op cit note 2 at 2. Torri & Laplante op cit note 52 at 10; see also Rauf op cit note 50 at 37.

[115] Ibid.

[116] UNCTAD (2018) op cit note 111 at 11; see also UNCTAD (2012) op cite note 76 at 9; Rochelle Spencer, Martin Brueckner, Gareth Wise & Marika Bundak 'Capacity Development and Indigenous Social Enterprise: The Case of the Rirratjingu Clan in Northeast Arnhem Land' (2017) 23 *Journal of Management & Organization* at 841.

[117] Ibid.

that TK holders are social entrepreneurs[118] who generate process innovations, for example, in 'networking, collaboration, group formation, and organisational governance and management practices.'[119] These activities are entrepreneurial, irrespective of their economic outputs, as they not only produce 'tangible, alienable (economic) values' but also develop 'inalienable (social) values and (inter)actions.'[120] Likewise, Oriakhogba's study shows how rural Zulu women bead workers, are addressing personal and shared social challenges of poverty, inadequate health care, housing, access to education for their children, among others, through social entrepreneurship and inclusive innovation.[121] Thus, TK holders engage in entrepreneurship to meet local needs due to gaps left by a State, which is no longer supplying the much-needed products and services.[122]

TK holders' institutions, also hold great promise in driving transformational entrepreneurship amongst TK holders, since transformational entrepreneurship foresees the possibility of transformational contribution by non-firms, that is, organizations such as cooperatives, non-governmental organizations and public institutions.[123] Be that as it may, existing literature has not critically examined the role of TK holders' and their institutions in promoting entrepreneurship yet they hold vital data that can be tapped to spur entrepreneurship for community benefit.

4.5 TK holders' institutions, data and data governance

TK holders' institutions are data repositories explaining why they are able to generate innovations, and contribute towards the strengthening of other institutions. Through the institutions, vital data is collected, shared, analysed and applied to provide expertise, monitor, plan, and manage disasters such as

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[118] Rutert & Traynor op cit note 82 at 5. See also UNCTAD (2018) op cit note 111 at 9.
[119] Rutert & Traynor op cit note 82 at 4.
[120] Ibid at 5.
[121] Oriakhogba op cit note 108 at 145-172.
[122] Tatiana Thieme 'Turning Hustlers into Entrepreneurs, and Social Needs into Market Demands: Corporate–Community Encounters in Nairobi, Kenya' (2015) 59 *Geoforum* at 230; see also Kari Koskinen 'Inclusive Innovation in the Private Sector: The Case of East African Technology Start-Ups' (2017) *Proceedings of the 50th Hawaii International Conference on System Sciences,* 4159-4168 at 4162.
[123] UNCTAD 'The Least Developed Countries Report 2018- Entrepreneurship for structural transformation: Beyond business as usual' (2018) at 13.

drought, famine, disease or bad omen to the community.[124] For instance, the Afar pastoralists in Ethiopia are able to predict weather and climate through the observation of stars, winds, livestock, insects, birds, trees and other wildlife.[125]

While data is defined as 'factual information that has been collected together for reference or analysis, or numerical information represented in a form suitable for computer processing'[126] in the context of Indigenous peoples, the term refers to 'information or knowledge, in any format or medium, which is about and may affect Indigenous peoples both collectively and individually.'[127] Data is a critical tool for advancing and attaining the cardinal objectives and development aspirations of Indigenous Peoples[128] including realising the right to self-determination. However, data is intimately linked to the sovereignty and self-determination of all nations[129] hence the term data sovereignty, which refers to the right of States in relation to other States or entities to govern the collection, ownership, access and use of data within its jurisdiction.[130] Consequently, the concept of data sovereignty allows States to control and own data belonging to TK holders (some of whom are Indigenous peoples).

Due to contestation over the sovereignty of Indigenous peoples and some of their rights in specific national contexts, they have had a troubled relationship since colonial times regarding how data concerning them is generated, accessed, shared, applied and owned by the State.[131] This is in spite of the fact that their

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[124] Nyamweru (1998) op cit note 16 at 11.

[125] International Fund for Agricultural Development (IFAD) 'The Traditional Knowledge Advantage: Indigenous peoples' knowledge in climate change adaptation and mitigation strategies' (2016) at 7.

[126] Elahi *et al* op cit note 4 at 18.

[127] Open Communique from the Indigenous Data Sovereignty Summit, Canberra, ACT, to all individuals involved in data and data infrastructure in Australia, *Indigenous Data Sovereignty* (June 20, 2018) available at https://perma.cc/8VPR-9TTL accessed on 12/12/2020.

[128] Chidi Oguamanam 'Indigenous Data Sovereignty: Retooling Indigenous Resurgence Development' CIGI Papers No. 234 (2019) at 8.

[129] Ibid at 4.

[130] Ibid; see also Rebecca Tsosie 'Tribal Data Governance and Informational Privacy: Constructing "Indigenous Data Sovereignty" 80(2) (2019) *Montana Law Review* at 230.

[131] Oguamanam op cit note 128 at 4.

ability to realise their rights to self-determination and leverage their development aspirations is anchored, to a large degree, on the issue of data sovereignty.[132]

While the conventional conceptions of the term data are broad, this study conceptualises the term data narrowly, by focusing on the TK that is generated, maintained, controlled, protected and developed by a community, and that is essential to their survival and livelihoods. Such TK (data), is developed within, and through TK institutions.

The data produced by TK holders provides 'information, guidance, help and support and gain most from developing social capital.'[133] In the context of Indigenous peoples, 'authentic data drives policy formulation, decision making and mapping of development aspirations, problem solving and other calculations critical to Indigenous resurgence in a range of fields.'[134] Moreover, data produces ways of doing which are unique to a specific place;[135] and is responsible for 'the effective and sustainable expansion of the capabilities and opportunities of the poor.'[136] This is because it is accessible and applicable, and communities are able to effectively build on it to create innovative processes.[137] In a collaborative context, TK can 'empower other types of knowledge and innovation,'[138] explaining why development activities that work with and within TK and traditional institutions have several advantages over projects that operate outside them.[139] Indeed, development agencies including the World Bank recognise the importance of integrating TK into development and poverty eradication

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[132] Ibid at 10.

[133] Kamoto *et al* op cit note 126.

[134] Oguamanam op cit note 128 at 5.

[135] Hoffecker op cit note 79 at 4.

[136] Berdegue op cit note 9 at 10; see also Nicolas Gorjestani 'Indigenous Knowledge for Development' available at
https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&u
act=8&ved=2ahUKEwjdpfaApZHlAhVB2AKHSSAB68QFjAAegQIABAB&url=http
%3A%2F%2Fweb.worldbank.org%2Farchive%2Fwebsite00297C%2FWEB%2FIMA
GES%2FIKPAPER_.PDF&usg=AOvVaw2kFdKUZvXetZEktv7dHpZH, accessed on
25/09/ 2019.

[137] Torri & Laplante op cit note 52 at 10.

[138] Rizk *et al* op cit note 43 at 31.

[139] Torri & Laplante op cit note 52 at 10.

ventures[140] yet there is little research about the role of TK in innovation policies and ISs.[141]

The social networks created by TK holders around their innovations do enhance their capacities to create, use and disseminate TK.[142] As noted earlier, such networks interface with external networks, thus giving insights into how TK holders' innovation can be influenced by, or interact with, scientific (secondary) innovation specifically, and formal systems at large. While this interaction can result in the revitalisation of TK, it might occasion the conversion of TK into commodities that are controlled by new elites, due to power imbalances.[143] This is so because some of the efforts at revitalisation of TK, such as documentation, may among other things, alienate the relevant TK from the "protocols and epistemologies in which they were previously embedded."[144] In addition, engagement with external actors may invoke concerns regarding what kind of TK should be disclosed in local innovation networks, and what should not. Moreover, engagement with external entities, primarily science-based innovation firms, tends to fill the void left by insufficient government investment in TK, only in instances where they become entitled to the appropriation of TK through the IP system.[145] This justifies an exploration of TK holders' institutions, and the roles they can perhaps play, in defining what constitutes TK holders' data, and appropriate ways of securing that data.

5 Findings and analysis

5.1 TK holders' institutions: nature and existence
In the case studies, there is evidence of existence of TK holders' institutions, in the form of customary laws, customs, traditions, family secrets, oral agreements, sharing mechanisms, community sanctions, trust, councils of elders, social capital and individuals holding specialised TK.

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[140] Gorjestani op cit note 136 at 3.
[141] Jauhiainen & Hooli op cit note 87 at 90.
[142] Torri & Laplante op cit note 52 at 1.
[143] Ibid at 7.
[144] Ibid at 8.
[145] Grant Isaac & William Kerr 'Bioprospecting or Biopiracy: Intellectual Property and Traditional Knowledge in Biotechnology Innovation' (2005) 7 *The Journal of World Intellectual Property*, 35-52 at 36.

TK holders' institutions are grassroots decision-making units through which diverse social problems are identified and solutions provided at the local level. For instance, among the Mijikenda, the *kaya* elders seem to perform most of the functions listed by Mowo *et al*. In the Mbeere case study, the main institution in charge of traditional pottery are elderly women,[146] who do not have many other roles in the community like the *kaya* elders.

As mentioned earlier, TK holders' institutions are governance frameworks that provide answers to contemporary problems faced by TK holders, as evidenced by the work of *kaya* elders in conservation. As data repositories, they play a central role in the creation, diffusion and application of innovation; while the innovation they generate continues to replenish and strengthen them. This also explains why those institutions can boost and contribute to peace, justice and the building of strong institutions.

Unlike conventional IP institutions, TK holders' institutions take a more inclusive and pragmatic approach to gender, as demonstrated by the prominent role played by elderly Mbeere women in conducting traditional pottery and transmitting those skills to young women. Studies have shown that the IP system does promote gender bias against women innovators and creators[147] demonstrating its inappropriateness in promoting and protecting innovative activities by women. Therefore, TK holders' institutions are able to accommodate the participation of women, and even men depending on a given context as aspects of their gender inclusivity in innovation. Further, they thus produce varied innovations that may deal with a wide range of social problems, such as environmental degradation, and poverty that may affect different segments of society.

5.2 Roles of TK holders' institutions in promoting innovation
TK holders' institutions have a role in advancing innovation. Those institutions (social capital/networks) provide what De Beer *et al* describe as a 'local innovation system.'[148] They are the space that supports learning, knowledge production and utilisation; innovation promotion and exchange; and flow of

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[146] Interview with Mbeere traditional potters on 12/11/2019.
[147] Bartow op cit note 8 at 551 – 584.
[148] Beer *et al* op cit note 61 at 60.

knowledge and innovation.[149] In the Mbeere case study, senior women transmit intergenerationally pottery skills and practices to young women, either through apprenticeships or experiential learning.[150] Similarly, among the *kaya* elders, TK can be passed through divine intervention, for instance, where prophets get information on different calamities, diseases and outbreaks, and pass the same to elders.[151] The respective innovations have thus survived courtesy of the institutional dynamics that allow the flow and transmission of innovation intergenerationally.

TK holders' institutions allow communities to enhance their innovative capacity, and expand their institutional networks, at the local level and beyond. This increases their innovation output, as they access information and learn new techniques of production. The General Coordinator of ABN explained that in their work they 'encourage the sharing of seeds within and outside communities to encourage diversity.'[152] The *kaya* elders have had a collaboration with UNESCO, where the latter supported the formation of the Mijikenda Council of Elders for all the nine sub-communities, and gave funding to hire forest guards.[153] Moreover, UNESCO has donated funds that were used to give awards to *kayas* that are doing well in conservation thus incentivising elders and enhance competitiveness in conservation.[154] Thus, strengthening TK holders' institutions, would correspondingly enable communities to collaborate effectively with relevant actors, and help advance their innovation activities.

TK holders' innovations are mainly geared towards meeting some social goals (drawing parallels with social innovation), and not necessarily profit making. One respondent indicated that 'the driving force for TK holders is not economic but revitalization of knowledge and practices.'[155] Among the Mbeere people, pottery was not done for sale, although nowadays this has changed.[156] Additionally, the goals and expression of TK holders' innovations, at times, have

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[149] Torri & Laplante op cit note 52 at 1.
[150] Interview with Mbeere traditional potters on 12/11/2019.
[151] A meeting with *kaya* elders at Kaloleni on 04/11/2019.
[152] Interview with the General Coordinator of ABN at Thika on 14/10/2019.
[153] A meeting with *kaya* elders at Kaloleni on 04/11/2019.
[154] A meeting with *kaya* elders at Kaloleni on 04/11/2019.
[155] Interview with the General Coordinator of ABN at Thika on 14/10/2019.
[156] Interview with Mbeere traditional potters on 12/11/2019.

less to do with products, and everything to do with services to society. The innovations tend to take the form of 'services to the land' with huge public benefits in terms of biodiversity, and environmental and climate values, which are not easily convertible into income streams.[157] The *kaya* elders have through long interaction with their environment, developed innovative practices and systems for regulating access to the forests, medicinal plants, sacred *kaya* areas, rare species, traditional knowledge and agricultural activities.[158] Moreover, the pottery activities of the Mbeere women contributes to firewood conservation, as the traditional pots retain more heat than normal cooking pots.[159] According to the General Coordinator of African Biodiversity Network (ABN),

> *"The greatest contribution of communities to SDGs mostly is in climate change, environment and water. The revival of seeds, biodiversity and ecosystems contributes to SDGs because we work in a holistic manner. This work contributes to adaptation and improved nutritional levels amongst the communities."[160]*

Through bridging social capital, TK holders' institutions act as special vehicles that promote the commercialisation and efficient diffusion of innovation in society.[161] For instance, the *kaya* elders have collaborated with TICAH, a CSO, in efforts towards documenting and commercialising their traditional medicine. The *kaya* elders provided knowledge on plants with various healing properties, while TICAH offered training on various ways of preparing drugs for purposes of commercialisation and wider reach of the drugs. The elders indicated that the collaboration was successful, and it helped improve the relationship between the youth and elders.[162] They have also collaborated with NMK in preserving their TK, traditions and cultures, and with the county government of Kilifi in having forest guards to protect the forests.[163]

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[157] Drahos & Frankel op cit note 52 at 24.
[158] Interview with an environmental scientist working with the CFCU at Kilifi on 05/11/2019.
[159] Workshop with women potters in Mbeere held on 13/11/2019.
[160] Interview with the General Coordinator of ABN at Thika on 14/10/2019.
[161] UNCTAD (2012) op cite note 76 at 9.
[162] A meeting with *kaya* elders at Kaloleni on 04/11/2019.
[163] Ibid.

Whereas through collaborations, TK can empower other types of knowledge and innovation,[164] as mentioned earlier, collaborations aimed at commercialisation, may occasion the loss of TK and innovation, especially if they are not carried out through TK holders' institutions. For instance, efforts by the government and some non-governmental organisations to introduce the throwing wheel (a modern technique of making pots instead of hand pottery) among the pottery communities to make the process more efficient and less labour intensive, was rejected by potters so as to preserve the sanctity of cultural and communal processes of knowledge production.[165] Moreover, they may have rejected mechanised production as it is likely to weaken traditional institutions due to less reliance on TK and related practices. Further, they could have been motivated by market demands, since hand-made and home-made crafts and cuisines respectively, tend to attract higher value than mechanised and mass produced/commercial counterparts of the same crafts. To preserve the sanctity of cultural and traditional processes of production, from adulteration and destruction, there is need to strengthen TK holders' institutions.

Further, TK holders' institutions can also facilitate the adaptation of new innovation and technologies to local needs and conditions by, *inter alia,* improving access to, and management of natural resources, sharing experiences, facilitating access to inputs and outputs, offering training, improving the availability of information, strengthening bargaining power with intermediaries and participating in public research and extension.[166] For instance, whereas the pottery practices and skills of the Mbeere have been transmitted intergenerationally,[167] there are new designs and/or shapes that the community is developing. A good example is vessels designed for planting flowers, which have perforated bases, to serve as flower vases. Such shapes and designs have not been archaeologically discovered[168] meaning they are new additions to the design repertoire.

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[164] Rizk *et al* op cit note 43 at 31.
[165] Angela Langenkamp 'Structural Changes of the Potters Craft in Kenya: A Regional and Gender-based Disparities' PhD Thesis, Universitätsverlag Rasch Osnabrück (2000).
[166] Beduschi *et al* op cit note 65 at 4. UNCTAD (2012) op cite note 76 at 10.
[167] Interview with Mbeere traditional potters on 12/11/2019.
[168] Wangari op cit note 35 at 62.

The fact that TK holders' institutions take a pragmatic approach to gender suggests that they engender inclusivity in innovation processes by enabling women, men and other social groups in a community to participate and benefit from innovations.[169] The Mbeere case study shows that TK holders' innovation is gendered. Traditional pottery is a preserve of women since time immemorial, and men only offer ancillary support, such as transportation of large clay bags to the potting sites, or of finished pots to the market.[170] This contrasts with the Mijikenda, where the *kaya* elders are mostly men. Thus, TK holders' innovation and processes have a pragmatic approach to gender, and offer women opportunities to innovate, participate in, and benefit from innovation processes.[171] Strengthening TK holders' institutions will allow both men and women to participate in and benefit from innovation, and diversify the innovation and innovation processes, creating more opportunities for the community to better their livelihoods.

5.3 Roles of TK holders' institutions in the building and strengthening of other institutions

The popularity, resilience and legitimacy of TK holders' institutions suggests that there is need to interrogate how they can be harnessed to promote the building of strong institutions in view of failure by most African governments to provide critical goods and services to communities.

As custodial institutions, TK holders' institutions are being used in the case studies to regulate access to and use of natural resources (including associated TK). Among the Mijikenda, the governance of the *kaya* forests is through customary rules that are enforced by elders using traditional sanctions to censor misuse of resources.[172] The *kaya* elders 'control access to resources such as medicinal plants, sacred *kaya* areas, and rare species; traditional knowledge and agricultural activities' and 'are the ones who allocate those resources to clans

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[169] Petesch *et al* op cit note 9 at 5.
[170] Ibid.
[171] Berdegue op cit note 9 at 7.
[172] Patrick A. Kafu & Genevieve N. Simwelo 'Forest conservation in Kenya: Lessons from the African Traditional/Indigenous Education' (2015) 5(8) *Developing Country Studies* 140-144 at 142.

and individuals.'[173] Indeed, the very existence of the *kaya* forests is attributed to the work of elders in conservation, and not gazettement as a forest reserve, national monument or listing as a world heritage site.[174] The demarcation, surveying, and mapping of territories; gazettement as national monuments and listing of the *kaya* forests, as World Heritage Sites is done with the assistance of elders and other community members.[175] The role of the *kaya* elders in environmental conservation is thus useful in realising other SDGs such as energy (SDG-7), food (SDG-2), water (SDG-6) and climate action (SDG-13), and ultimately in strengthening formal institutions dealing with these SDGs.

Moreover, social capital contributes to the strengthening of both the TK holders' and formal institutions involved in the collaboration. As communities begin to work together, bonding social capital is strengthened within the group, particularly in terms of trust between members, the development of group norms, roles, and processes, and the development of a sense of 'can-do spirit' within the group which contributes to a growing sense of collective efficacy.[176] This explains why TK holders' institutions promote cultural unity and identity. For instance, the *kaya* elders and forests, are seen as a significant unifying factor for the Mijikenda people. The *kaya* forests are the 'cultural and traditional home' of the Mijikenda that 'serves to remind them and future generations of how they migrated from Shungwaya to that place.'[177]

Bridging social capital within TK holders' institutions enhances collaborations between those institutions and other institutions. Government agencies and civil society actors are relying on these institutions in their work of protecting and preserving TK. Among the Mijikenda, there are on and off collaborations between elders and NMK in preserving traditions and cultures.[178] For instance, *kaya* elders participated in the preparation of the 2014-2018 Mijikenda Kaya Forest Management Plan prepared by NMK. In conservation, herbalists from *kaya* Kauma have collaborated with the Gede Kenya Forest Research Institute

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[173] Interview with an environmental scientist working with the CFCU at Kilifi on 05/11/2019.
[174] Ibid.
[175] Ibid.
[176] Hoffecker op cit note 79 at 12.
[177] A workshop with *kaya* elders on 22/04/2018.
[178] Meeting with *kaya* elders at Kaloleni, Kilifi on 05/11/2019.

(KEFRI) regional headquarters to get technical advice on research programs that can improve the mangrove forest medicinal value. Moreover, they contributed in the preparation of the National Mangrove Management Plan being developed by the Kenya Marine and Fisheries Research Institute (KEMFRI). One respondent lamented how the engagement with formal state institutions has been disrespectful and contemptuous of TK institutions, thus hampering their effective incorporation in governance.[179] In Mbeere, while the potters are usually invited to schools to teach students how to make pots, the respondents indicated that there are no CSOs that supports their pottery practices.[180]

As mentioned earlier, collaborations between TK holders' institutions and the IP frameworks can enrich the IP regime and address the inadequacy, deficiency and unsuitability of the IP regime in protecting TK. Effectively, they can mediate interactions between the IP system and TK holders, and thus tame the misappropriation and loss of TK and genetic resources. For instance, TK holders' institutions can be used in granting prior informed consent (PIC) and in developing bio-cultural protocols to govern access to TK.[181] Additionally, having PIC and disclosure of origin as a criterion for patentability, would benefit TK holders since their institutions could be involved in the decision-making processes and institutions under the IP regime and *vice versa*. This collaboration can bridge the TK protection gap as TK holders can withhold their PIC so as to safeguard their rights, while the grant of IP rights over TK could also be withheld by relevant authorities, if there is non-disclosure of origin or proof of PIC is missing. This way the TK holders' institutions will contribute to the strengthening of IP institutions.

Moreover, the participation of women in TK holders' innovation (as is the case with the Mbeere potters) can help address institutional barriers to innovation created by the IP regimes. This way, TK holders' institutions can strengthen the IP policies, laws and institutions by making them gender sensitive by including women in decision-making processes, as key agents of innovation.
Similarly, TK holders' institutions are used in determining political leadership and maintenance of law and order. The *kaya* elders were described 'as a social-

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[179] Ibid.
[180] Interview with Mbeere traditional potters on 12/11/2019.
[181] A meeting with the director of Natural Justice in Kenya on 06/11/2019.

political epicentre of the Mijikenda people that is resorted to even by local politicians for blessings before venturing into politics.'[182] It is commonplace for those vying for political positions to seek the endorsement of the *kaya* elders. Clearly, they can play a role in strengthening political institutions, and in holding elected leaders to account.

As customary governance systems, TK holders' institutions are being used in conflict resolution among the Mijikenda. The *kaya* elders are the first port of call wherever there are disputes (including land, family and political) in the community. [183] They therefore contribute to enhanced access to justice, and strengthen institutions of justice.

5.4 Roles of TK holders' institutions in driving transformative entrepreneurship

Due to their role in driving innovation, TK holders' institutions provide a conducive environment for entrepreneurship, as they enhance the entrepreneurial capabilities and mind-set in the community.

As mentioned earlier, TK holders are 'not-for-profit entrepreneurs' as they mainly pursue social and collective goals. For instance, the conservation work of the *kaya* elders. However, that is not to say that they cannot derive economic benefits out of their entrepreneurial work. Some communities have traded, and are ready to convert some of their TK products and entrepreneurial activities into income generating ventures to improve their livelihoods. Among the *kaya* elders there are income generating activities such as establishment of tree nurseries, poultry farming and so on, aimed at reducing community dependency on natural resources for livelihood.[184] In *kaya* Kauma, there are plans to start levying students, researchers and tourists who may want to pay a visit to the permitted parts of the *kaya*. Additionally, there is a plan to register traditional songs and dances of the Kauma and provide entertainment services during government events and other communal gatherings.[185]

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[182] Interview with an environmental scientist working with the CFCU at Kilifi on 05/11/2019.
[183] Ibid.
[184] Meeting with *kaya* elders at Kaloleni, Kilifi on 05/11/2019.
[185] Ibid.

In Mbeere, whereas pottery plays cultural functions in the community, it is a source of livelihood to the potter. Thus, nowadays pottery is a complementary source of income to the women who sell their pots on market days especially in Ishiara town. Wangari explains that the shift towards commercialisation of pottery, is occasioned by the demand for pottery in neighboring regions such as Nyeri, Mururi, Kerugoya, Murang'a and Meru where pottery making does not take place.[186] The Mbeere potters explained that they are not paid *per se* for training school children traditional pottery, but only get refund for transport expenses, costs for transporting soil and a small token for the days spent training.[187] This allows the women to generate some income, and gives them an incentive to continually look for new training opportunities, and create new networks and social relations, thus engender entrepreneurship. Likewise, among the Mijikenda, plans to introduce income-generating activities by a CSO, Careway-Trust such as putting up tree nurseries, inventory of a craft industry, window curtains or manufacturing workshop are meant to reduce community dependence on the *kaya* forests for livelihoods/subsistence needs.[188] Therefore, strengthening TK holders' institutions, will not only advance innovation, but will help safeguard their survival and livelihoods, which are met through their innovative activities.

The intangible capacities within TK holders' institutions continue to enhance and promote TK holders' entrepreneurial spirit. For instance, the Mbeere women indicated that the people they sell their pots to are their ambassadors, as they market their pots and activities to other people and organisations.[189]

There are other entrepreneurship initiatives around the conservation work of the Mijikenda people. For example, a community-based organisation, Care Way-Trust has come up with different thematic areas to promote entrepreneurship. One scheme called '*tubadilike* scheme' seeks to introduce bee keeping around *kaya* forests, educating the wider community on terrestrial tree nurseries in their homes and starting grafting of citrus trees as income generating activities.[190] The

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[186] Wangari op cit note 35 at 78.
[187] Interview with Mbeere traditional potters on 12/11/2019.
[188] Interview with Caxton Mwanyenje, CEO Careway-Trust on 05/11/2019.
[189] Interview with Mbeere traditional potters on 12/11/2019.
[190] Care Way-Trust inventories, document with author.

'*mtoto asome*' seeks to create awareness among the youth on the importance of environmental conservation by teaching them techniques on tree planting for income generation.

5.5 Roles of TK holders' institutions in data governance
TK holders' institutions are data repositories and data governance structures holding data on community affairs such as knowledge, beliefs, values, 'regularized practices', customary rules, norms and practices. In the case studies, most data is gathered, stored and transmitted intergenerationally through TK holders' institutions. Among the Mijikenda, traditional ceremonies, rituals, prayers, and legends play a critical role in storage and sharing of information and knowledge.[191] A respondent stated that, 'cultural rituals for example the rites of passage in most communities provide a system of transmitting and guarding TK' since 'as one goes through the rites of passage, there is knowledge that is passed on to initiates.'[192] Some reports document how legends are used to pass on rules against cutting trees, fishing, hunting or cultivating in the sacred sites, among the Meru people of Kenya.[193] Moreover, there are legends about the ability of sacred sites to self-protect themselves 'from destruction by reacting and attacking any person who interfered with them by venturing into or doing anything forbidden at the sites.'[194] Similarly, the *kaya* elders explained that at times they 'rely on prophets who get information through divine intervention on how to deal with different calamities, diseases and outbreaks. That information is then given to elders.'[195] Data governance among the Mijikenda has a divine aspect in the sense that "once an elder die (chairman), elders keep his record/memory in a *kigango*, which represents the dead *kaya* elder and continues to 'speak' on his behalf."[196] The elders explained that most of these *vigango* were stolen and taken to museums abroad, although there are efforts to repatriate them.

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[191] A meeting with *kaya* elders at Kaloleni on 04/11/2019.
[192] Interview with the General Coordinator of ABN at Thika on 14/10/2019.
[193] Institute for Culture and Ecology (ICE) 'Documentation of traditional and ecological laws of Tharaka' undated report, 14 available at https://www.icekenya.org/publications/ accessed on 20/06/2018.
[194] Ibid.
[195] A meeting with *kaya* elders at Kaloleni on 04/11/2019.
[196] Ibid.

As data governance structures, they are the forum through which community decisions and norms are made[197] including regulating who can access, use, add data and have control of communal resources.[198] Among the Mijikenda, 'the *kambi* controls access to resources such as medicinal plants, sacred *kaya* areas, and rare species; traditional knowledge and agricultural activities' and 'are the ones who allocate those resources to clans and individuals.'[199] Access, use and sharing of data within the community is mediated by core principles like trust, honour, and integrity.[200] While common knowledge may easily be accessible, secret and sacred TK might not be accessible. This has significant implications since it means that secret and sacred TK might not be a proper subject of innovation collaborations and entrepreneurship because for local innovation to thrive, it is essential that the infrastructure and networks relating to it is disclosed to actors outside the circle of local innovators themselves.

The role of traditional institutions in TK governance includes: the identification of TK; ascertainment of beneficiaries; definition of custodianship; the nature of community custodianship over TK; the rights and responsibilities associated with custody, access rights, protection of customary use, means of dissemination and preservation of knowledge; and the customary mode of defining modalities of PIC, benefit sharing mechanisms, dispute settlement, and sanctions for infringement of customary law.[201]

In addition, the TK held by communities is 'a key element of the social capital of the poor and constitutes their main asset in their efforts to gain control of their own lives.'[202] Moreover, TK is 'the basis for decisions pertaining to food

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[197] Mark Bevir *Governance: A Very Short Introduction* (Oxford University Press, 2012) at 1.

[198] Jeremy de Beer 'Ownership of Open Data: Governance Options for Agriculture and Nutrition' Global Open Data for Agriculture and Nutrition Report) (2016) at 7.

[199] Interview with an environmental scientist working with the CFCU at Kilifi on 05/11/2019.

[200] Beer op cit note 233 at 12.

[201] Tobin op cit note 113; see also Ken Chisa and Ruth Hoskins 'African customary law and the protection of indigenous cultural heritage: Challenges and issues in the digitization of indigenous knowledge in South Africa' (2016) 15 *African Journal of Indigenous Knowledge Systems,* 1-15 at 4.

[202] Gorjestani op cit note 136 at 1.

security, human and animal health, education, natural resources management, and other vital activities.'[203] Among the Mbeere, for example, pot making is done during the dry season (August-October) because they can easily get dry grass and wood to harden the pots.[204] Further, reliance on TK holders' institutions in conflict resolution reveals that they hold vital information that aids in mediation of disputes with high degrees of societal and ecological complexity, as demonstrated by the work of *kaya* elders. [205]

Evidently, the above discussion shows that TK holders' institutions are pivotal in designing a strong regime for TK holders' data sovereignty.[206] Those institutions are better placed than formal state institutions in defining what constitutes data, outlining appropriate ways of securing the data, and governing control, use or reuse of their data by third parties, even where such data is gathered in the context of research studies. Indeed, one cannot conduct research among communities, such as the Mijikenda, without an ethical clearance and permission. Thereafter, the *kaya* elders determine the data and areas (within a *kaya*) that a researcher can access. Further, reliance on TK holders' institutions in developing community bio-cultural protocols and granting PIC,[207] strongly suggests that it is indeed possible to develop a collaborative framework where those institutions can be legally mandated with TK holders' data governance.

5.6 Challenges bedevilling TK holders' institutions
In spite of the existence of TK holders' institutions in both case studies, their vitality and influence are waning due to a multiplicity of factors. These include, leadership wrangles among elders, each claiming to be the legitimate elders; cultural erosion; loss of Indigenous territories due to developmental projects; and the influence of modern education and religions, which have contributed to the loss of traditional beliefs and values. For instance, among the Mbeere, young women and girls see pottery as 'foolishness and shameful' and have no interest

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[203] Ibid.
[204] Interview with Mbeere traditional potters on 12/11/2019.
[205] Interview with an environmental scientist working with the CFCU at Kilifi on 05/11/2019.
[206] Oguamanam op cit note 128 at 12-14.
[207] Francis Kariuki 'Traditional justice systems as *sui generis* frameworks for the protection of traditional ecological knowledge in Kenya' PhD thesis, University of the Witwatersrand (2019), 218-225.

in the art and practice. One respondent, who has practiced pottery for over 50 years, indicated that 'my daughter is almost 40 years but doesn't want to learn the practice.'[208] In the Mijikenda community, a negative perception towards elders has occasioned numerous attacks and killings of elders. One elder observed that, 'We will die with our knowledge, we are seen as witches. We are being killed because of white hair. We are not seen as good people.'[209] However, the elders indicated that they continue to conduct prayers, cultural rituals and other traditions to continually replenish and revitalise their TK and cultural expressions so that they are not lost.[210] Similarly, urbanisation has contributed to the low demand for pottery because many people in towns have resorted to the use of gas and electric cookers as compared to the pots that are commonly used on *jikos* and hearthstones.[211] However, and inasmuch as traditional pots are commonly used in cooking with firewood (in which case they are more energy efficient than ordinary aluminum pots), they can also be used with gas and electric cookers (which are more energy friendly than firewood) thus promoting conservation.

Most TK holders are living in poverty, and are experiencing capacity, financial, educational, skills, information, and infrastructure constraints to innovate on a large scale. Likewise, these constraints are also hindering entrepreneurship among TK holders and beyond due to lack of essential skills for business organization such as 'writing, reading, bookkeeping, project management, and even (potentially) fluency in the English language.'[212] The Mbeere potters face difficulties when transporting pots to distant markets due to their bulkiness and fragility, and lack expertise for mass production of pots to meet rising demands for pots, and get more income to meet survival and livelihood needs. .[213] However, earlier studies show that the potters had shunned mechanised forms of production.[214] To scale up and commercialise (if permissible by the holders) some of their innovations, TK holders can utilize their institutions to enter into

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[208] Interview with Mbeere traditional potters on 12/11/2019.
[209] Interview with a *kaya* elder at Kaloleni on 04/11/2019.
[210] Interview with a *kaya* elder from *kaya* Kambe at Kaloleni on 04/11/2019.
[211] Wangari op cit note 35 at 86.
[212] Rutert & Traynor op cit note 82 at 7.
[213] Workshop with women potters in Mbeere held on 13/11/2019.
[214] Langenkamp op cit note 165.

collaborations with other players to develop (according to their terms) and diffuse them. Nonetheless, there is need for caution in embracing modern systems of production, as they may erode the innovative capacity of TK holders and their institutions. Moreover, and as observed earlier, there are people who still prefer hand-made crafts as opposed to machine-made ones, for cultural, aesthetic, and functional reasons, which are factors that create demand for hand-made products. Hence those collaborations must acknowledge the value and potential for TK to empower other forms of knowledge and innovation.

The respondents lamented lack of support from government and CSOs. The author observed the lack of programs from CSOs or government to support and promote the pottery practices of the Mbeere. Unless there are concerted efforts to support the Mbeere women, the traditional pottery practices are likely to become extinct. As opined earlier, through their institutions, TK holders can increase their innovation output, learn new techniques of production, but also document their pottery knowledge and techniques, so that they can remain sustainable.

Similarly, the *kaya* elders observed that there is tension between them and chiefs and sub-chiefs, and in most cases the latter do not recognise or engage them in community affairs.[215] Finally, the *kaya* elders decried the fact that although they 'bless' or endorse secular or political actors, those leaders end up undermining them once they get power.[216]

6   Conclusions

The study sought to examine the role of TK holders' institutions in the realisation of SDG-9 (the study focused on innovation) and SDG-16 (study focused on the building of strong institutions) using the Mijikenda and Mbeere communities in Kenya. The study finds the existence of TK holders' institutions in the case studies. They have been resilient and are legitimate explaining their continued use in natural resources governance, conflict resolution and even in politics. Importantly, the findings show that the institutions have a role in driving

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[215] A meeting with *kaya* elders at Kaloleni on 04/11/2019.
[216] Ibid.

innovation, building strong institutions, engendering entrepreneurship and as data governance structures.

Regarding innovation, the study has shown that TK holders' institutions are instrumental in enhancing the innovation capacity of TK holders by creating the space that supports learning, creation and utilization of innovation; promotion of innovation; and the flow and exchange of innovation. The institutions also increase the innovation output of TK holders, by enabling the latter access information and learn new techniques of production. Additionally, the institutions allow TK holders to expand institutional networks, at the local level and beyond, thus accessing resources to advance their innovation. Through those networks, TK holders' institutions promote the commercialisation and efficient diffusion of innovation in society; and facilitate the adaptation of new innovation and technologies to local needs and conditions. Further, and due to their pragmatic approach to gender, they engender inclusivity in innovation processes by enabling women, men and other social groups in a community to participate and benefit from innovations. Lastly, TK holders' institutions are better placed in protecting TK holders' innovation in view of the challenges they encounter in using the IP systems. However, and whereas TK holders, are likely to benefit from collaborations with formal institutions like the IP framework in promoting their innovations and transformational entrepreneurship, those collaborations ought to be built through strong institutions that are dynamic, flexible, locally legitimate and responsive to social, political and environmental changes. Reliance on stronger TK holders' institutions can help stop the disenfranchising outcomes while interacting with external networks, and uphold communities' self-determining rights.

In the building of strong institutions as desired by SDG-16, the study has shown that TK holders' institutions continue to enjoy popular legitimacy, and play an essential role in conflict resolution, natural resources governance, in determining political leadership and maintenance of law and order, especially in the Mijikenda case study. As such, they can be used collaboratively with formal institutions like the justice system, natural resources governance institutions, and the IP system, to build strong and inclusive governance frameworks. From the case studies, it is evident that unlike the IP regime, TK holders' institutions have an inclusive and pragmatic approach to gender (thus promoting attainment of

SDG-16 by being inclusive), offering both men and women opportunities to participate in, and benefit from innovation processes (essentially meeting SDG-9 by encouraging inclusivity in innovation). The study shows that the role of TK holders' institutions in the attainment of SDG-9 and 16 contributes positively in the realisation of other SDGs also. Some of the innovative activities that TK holders are engaged in, such as conservation of the environment, and making of pots that are energy efficient, can contribute to advancing other SDGs such as energy (SDG-7), climate action (SDG-13), food (SDG-2), life on land (SDG-15) and water (SDG-6).

Due to their role in driving innovation, TK holders' institutions provide a conducive environment for entrepreneurship, as they enhance the entrepreneurial capabilities and mind-set in the community. They also determine the prevalence, type and nature of entrepreneurial activities that TK holders engage in. through bridging social capital, TK holders are able to link up with other social and economic agents, and thus access vital resources, infrastructure, skills and knowledge within the community and beyond, which boost entrepreneurship.

Lastly, the study has shown that TK holders' institutions are pivotal in designing a strong regime for TK holders' data sovereignty, as they are data repositories and data governance frameworks. The data they hold underlies their capacity to innovate; strengthens institutions; manage, monitor and mitigate risks; and has impact on prevalence, type and nature of entrepreneurial activities that they can engage in. As data governance frameworks, they hold the promise in the realisation of the developmental needs and aspirations of TK holders.