



## Inclusive innovation processes in Tanzania: From national policies to local practices in innovation hubs

Lauri Hooli, Emma Nkonoki & Ville Leppänen

**To cite this article:** Lauri Hooli, Emma Nkonoki & Ville Leppänen (2024) Inclusive innovation processes in Tanzania: From national policies to local practices in innovation hubs, African Journal of Science, Technology, Innovation and Development, 16:7, 940-952, DOI: [10.1080/20421338.2024.2398835](https://doi.org/10.1080/20421338.2024.2398835)

**To link to this article:** <https://doi.org/10.1080/20421338.2024.2398835>



© 2024 The Author(s). Co-published by NISC Pty (Ltd) and Informa UK Limited, trading as Taylor & Francis Group



Published online: 09 Oct 2024.



Submit your article to this journal [↗](#)



Article views: 85



View related articles [↗](#)



View Crossmark data [↗](#)

## Inclusive innovation processes in Tanzania: From national policies to local practices in innovation hubs

Lauri Hooli <sup>1\*</sup>, Emma Nkonoki<sup>2</sup> and Ville Leppänen<sup>2</sup>

<sup>1</sup>*Department of Geography and Geology, Faculty of Science, University of Turku, Finland*

<sup>2</sup>*Department of Computing, Faculty of Technology, University of Turku, Finland*

\*Corresponding author email: [lauri.hooli@utu.fi](mailto:lauri.hooli@utu.fi)

Inclusive innovations have the potential to foster socio-economic development and actively involve local communities in innovation processes in sub-Saharan Africa. The importance of inclusive innovations is emphasized in the public strategies and development programmes in the region. Nevertheless, despite some donor-funded initiatives, there remains a lack of systematic knowledge on how to effectively implement inclusive innovation in communities. This research aims to scrutinize the role of inclusive innovation in Tanzania. We conduct policy analyses of the country's official innovation strategies and investigate the inclusive innovation activities undertaken by 12 innovation hubs. These hubs facilitate interactions among diverse actors, provide necessary facilities and technologies, and offer mentorship and peer support. Our results reveal that the definition and significance of inclusive innovation are presented within the national policies. However, implementation programmes are currently modest and scattered. With a few exceptions, innovation hubs have inadequate understanding and limited resources for implementing inclusive innovations in practice. This research contributes by underscoring the need for comprehensive strategies, capacity-building initiatives, and collaborative efforts to fully leverage inclusive innovation for sustainable development in the region.

**Keywords:** Africa, innovation hub, inclusive innovation, inclusive innovation policy, Tanzania

### Introduction

Innovation is one of the key drivers for sustainable global socio-economic development, and it is increasingly difficult to envision any major development strategy or humanitarian intervention without considering the role of innovation (Krause 2013). The ninth Sustainable Development Goal in the 2030 Agenda for Sustainable Development, adopted by all United Nations Member countries in 2015, emphasizes the promotion of inclusive and sustainable industrialization and fostering innovation (United Nations 2015; see also UNDP 2020). The African Union's Agenda 2063 underscores the importance of science, technology, and innovation (STI) as essential tools to address economic and social challenges in Africa (AU 2013). Furthermore, there has been a recent shift in innovation research towards transformative innovation policies, which aim to address global grand challenges related to environmental and social issues, going beyond mere economic growth (Diercks, Larsen, and Steward 2019; Haddad et al. 2022 Schot and Steinmueller 2018; Tartaruga, Sperotto, and Carvalho 2024; Weber and Rohracher 2012).

Recent studies indicate that innovations have a significant role in poverty alleviation (Kakeu et al. 2024, Fagbemi and Ajibike 2024). However, the relationship between innovation and development is complex, and global innovation geography remains highly uneven (Shearmur, Carrincazeaux, and Doloreux 2016). Since the early 2000s, scholars have argued that normative technological innovations have failed to address the needs of the global poor, and have called for alternative approaches that incorporate pro-poor processes, services, products, and organizational forms into the innovation discourse (Arocena and Sutz 2003; Arocena and Sutz 2014; Bryden

et al. 2017; Chataway, Hanlin, and Kaplinsky 2014; Jiménez 2019; Lundvall, Vang, and Joseph 2009; Muchie, Gammeltoft, and Lundvall 2003; Papaioannou 2014, 2018; Planes-Satorra and Paunov 2017; Schillo and Robinson 2017; Woodson and Williams 2020). For instance, Joseph (2014) illustrates how STI policy reforms in India during the 2010s led to significant economic and income growth in the country but also widened the income gap within society. Innovation often exacerbates inequality, as most innovations target middle- and high-income consumers, neglecting the needs of the poor majority (Heeks, Foster, and Nugroho 2014; Ramani et al. 2023). Moreover, innovation-related policies often prioritize economic development over social developmental needs, requiring a high level of knowledge, social capital, and economic risk-taking (Kaplinsky 2014; Lee 2023).

To align innovation policies with the specific development needs of sub-Saharan Africa, it is important to tailor the general concept of innovation to better respond to the circumstances of local communities. This requires a shift towards inclusive, participatory, and transformative innovation processes that actively engage local communities (Chataway, Hanlin, and Kaplinsky 2014). User-centered approaches, service orientation, and non-technological incremental advancements characterize these inclusive processes. To address these needs, various concepts have emerged, including frugal innovations, grassroots innovations, social innovations, bottom-of-the-pyramid (BoP) innovations, pro-poor and from-the-poor innovations, below-the-radar innovations, mission-oriented innovations, responsible innovations, and transformative innovations (Al-Jayyousi et al. 2023; Maldonado-Mariscal 2023; Paunov 2013). Generally, the Organisation for

Economic Co-operation and Development (OECD 2012; see also UNDP 2020) labelled these different frameworks as inclusive innovations.

Inclusiveness, in this context, is defined as the opposite of social and economic exclusion (Papaioannou 2018; Ramani et al. 2023). Inclusive innovations are characterized by open, democratic, and novel social configurations that aim to create more equitable innovation processes (Chesbrough 2003; Chesbrough and Appleyard 2007; Dutilleul, Birrer, and Mensink 2010; George, Merrill, and Schillebeeckx 2021; Pansera and Owen 2018; Von Hippel 2006; Von Hippel and Katz 2002). They involve the implementation of new ideas to generate opportunities for social and economic well-being among the global poor, focusing on the everyday challenges of their lives (George, Merrill, and Schillebeeckx 2021; Gupta et al. 2016 Singh and Roy Burman 2019;). In addition to economic inclusion such as affordable and accessible products or services, inclusive innovation processes also prioritize social and environmental aspects of innovation (Papaioannou 2018; Patnaik and Bhowmick 2020).

Despite the popularity and case studies of single projects or technological sectors promoting inclusive innovation, the existing literature lacks an understanding of how inclusive innovation is addressed in national innovation policies and, more especially, how these policies are implemented in local communities. To address this research gap, we contribute to the existing literature by focusing on the nexus between inclusive innovation strategy and practice. We conduct a qualitative case study in Tanzania by asking two interconnected research questions: firstly, we ask, how inclusive innovations are addressed in the main innovation-related policies in Tanzania, and secondly, we ask, how inclusive innovations are implemented through innovation hubs in Tanzania? Tanzania presents a compelling case study for researching inclusive innovation in sub-Saharan Africa. Primarily the emergence of pressing grand challenges, such as rapid population growth and urbanization, have created complex problems that demand inclusive solutions involving local communities. In addition, Tanzania has taken a notable step forward by publishing its first draft of the national innovation framework, signalling a growing recognition of the importance of innovation in addressing these challenges. Moreover, over the past decade, a remarkable number of new innovation actors, including innovation hubs, have emerged, further highlighting the dynamic and evolving innovation landscape in the country.

The empirical material for our research encompasses ethnographic observations and qualitative triangulation of diverse research materials. In addressing the first research question, we thoroughly analyze the key policy documents of innovation in Tanzania, supplemented by insightful interviews with relevant stakeholders. This approach enables us to gain a comprehensive understanding of the policy landscape and its implications. To address the second research question, we conduct ethnographic research through a combination of participatory observation and interviews specifically focused on 12

innovation hubs in Tanzania. These innovation hubs serve as open platforms and intermediating organizations that play a crucial role, alongside the private sector, in implementing and promoting innovations throughout sub-Saharan Africa (Friederici 2016). By engaging with these innovation hubs, we aim to explore their practices, dynamics, and contributions to the inclusiveness of the local innovation system.

The paper is structured into six sections. The next section focuses on inclusive innovation and innovation hubs, providing a contextual understanding from a sub-Saharan African perspective. In the section thereafter, the methods and empirical material collected for this research are described in detail. This is followed by the section that delves into the Tanzanian context of innovation development and addresses our first research question. The penultimate section analyzes our ethnographic research material gathered from 12 Tanzanian innovation hubs and addresses our second research question. Lastly, in the final section, we conclude the paper by discussing the implications of our empirical findings within the broader context.

### **Inclusive innovation in innovation hubs of southern Africa**

Joseph Schumpeter (1934) defined innovation as the introduction of a new or significantly improved product, raw material, process, market, or organizational arrangement. It is recognized as a systematic and complex learning and knowledge-creation process involving the private sector, research institutes, and government (Pavitt 2002). In addition, also actors such as local communities, non-governmental organizations (NGOs), and transnational partners have a significant role in innovation development. To facilitate interaction and (tacit) knowledge exchange among different stakeholders, physical and cognitive proximity is needed (Asheim, Grillitsch, and Trippel 2016).

The systematic interaction with various actors is often framed within the concept of an innovation system, which encompasses the economic, political, social, institutional, and organizational actors and factors influencing the use, development, and diffusion of innovations (Edquist 2005). Concentrated networks of innovation-related stakeholders promote formal and informal communication, knowledge exchange, and learning. Earl et al. (2023, 300) argue that although a systemic approach to innovation serves as a crucial framework for inclusive innovation, it requires flexible adaptation to address complex social, environmental, and economic challenges. For inclusion, the system must also integrate actors who are typically excluded from traditional innovation frameworks (van der Merwe and Grobbelaar 2018).

Innovation hubs have emerged as popular intermediate platforms that facilitate the physical interaction necessary for innovation development (Gandini 2016; Parrino 2015; Vidaillet and Bousalham 2020). The hubs serve as inspiring physical spaces that embrace cultural and architectural openness, providing the necessary infrastructure for knowledge sharing and co-working. They bring together diverse actors, including (start-up)

companies, researchers, funders, and residents (Jakonen et al. 2017). Innovation hubs vary in their strategic focus and user base. Some focus on co-working, incubating innovations, and accelerating start-up companies. Others are affiliated with universities and aim to commercialize scientific findings. Certain hubs facilitate product development for larger corporations by enabling interaction with end users. In southern Africa, innovation hubs that focus on transforming everyday challenges faced by communities into valuable innovation opportunities have gained significant traction (Hooli, Jauhiainen, and Lahde 2016). Inclusive innovation processes often balance between achieving economic success and delivering inclusive benefits (Desta 2018; Lee 2023). Innovations that focus solely on maximizing profit may lose their inclusiveness, while those targeting deep inclusiveness might not achieve economic success. Therefore, inclusive innovation processes tend to be more successful when non-corporate entities, such as innovation hubs, are involved (Ramani et al. 2023).

Critical scholars have highlighted the tension within innovation hubs, which emphasize community and collaboration while simultaneously promoting individualistic flexibility, autonomy, and competition that uphold and reproduce the neoliberal entrepreneurial subject (Gandini 2016; Merkel 2019; Vidaillet and Bousalham 2020). Local communities in Southern Africa often experience negative consequences from previous innovations, such as climate change or unhealthy environments, without having the opportunity to actively influence these changes. The involvement of the global poor in innovation processes has been limited, and when innovations draw on their (indigenous) knowledge, they are excluded from the benefits (Hooli and Jauhiainen 2018).

Innovation processes are often considered apolitical, despite their normative implications regarding whose interests, knowledge, and outcomes are deemed relevant (Bryden et al. 2017). Papaioannou (2018) argues that equity, bottom-up participation, transformative non-hierarchical modes, and indigenous knowledge are frequently overlooked in these normative considerations of innovation. Too often, local communities are merely viewed as end-users of innovation outputs, rather than active stakeholders who participate in the development of innovations that improve their well-being (Shearmur, Carrincazeaux, and Doloreux 2016). In Southern Africa, many innovations are developed without a deep understanding of the local socio-economic context (Hooli 2024), leading to a mismatch between the needs and opportunities of the global poor and the suitability of existing innovations for new contexts (Kaplinsky 2014). Therefore, Heeks and his colleagues (2013, 177–178; also Heeks et al. 2013) have established a more refined analytical framework, where they delineated inclusive innovation into six levels of inclusion. This framework is important, as it highlights that the communities included in the framework do not only benefit from the outputs of innovations but are an inherent part of the entire process from setting the objectives and development of inclusive innovation (Earl et al. 2023).

The first level is *intention*, which denotes that innovation developers possess the intention to address the challenges faced by marginalized individuals. The second level is *consumption*, indicating that innovation is considered inclusive if it is readily adopted and utilized by excluded groups. The third level is *impact*, whereby innovations are deemed inclusive if they have a positive and tangible effect on the livelihoods of marginalized communities. The fourth level is *process*, which signifies that innovation is considered inclusive when it involves the active participatory process where innovation activities empower marginalized individuals to become proactive stakeholders in their development. For instance, numerous innovation hubs in Southern Africa are empowering marginalized community members by providing essential IT, technology, and entrepreneurial education, while also transforming everyday challenges into opportunities for inclusive innovation (Hooli, Jauhiainen, and Lahde 2016).

The fifth level is *structure*, where innovation is deemed inclusive when it is created within inclusive structures. This definition encompasses innovation policies that involve local participation throughout the process and strive to create opportunities for innovations rooted in local knowledge, driven by responsible practices, and guided by open innovation principles (Singh and Roy Burman 2019). Lastly, the sixth level is *post-structure*, which suggests that innovation is inclusive if it is created within a framework of knowledge and discourse that is inherently inclusive itself. It recognizes the importance of inclusive perspectives and approaches within the broader context of innovation. Despite this taxonomy, Heeks, Foster, and Nugroho (2014) elaborate that these different levels are not mutually exclusive; rather, higher levels typically encompass and accept the inclusion of the levels below them, promoting a holistic understanding of inclusive innovation.

### Research data and methodology

Our empirical research is based on a qualitative ethnographic research approach, which includes policy analyses, ethnographic observations, and semi-structured interviews. The qualitative policy analyses involved an examination of the main policy documents related to innovation development in Tanzania. Of particular focus was the *National Innovation Framework* (NIF) published by the Tanzania Commission for Science and Technology (COSTECH) of the Ministry of Education, Science, and Technology (MoEST 2022), which serves as the country's primary innovation-related document.

Ethnographic observations were conducted between 2020 and 2023 among various stakeholders in the Tanzanian innovation system, primarily in Dar es Salaam and Iringa. These observations encompassed attending the Tanzania Innovation Weeks five times and participating in the Sahara Sparks startup and innovation event four times, both of which are the largest and most significant innovation and technology-related events in Tanzania. Additionally, information was gathered from annual reports of system stakeholders and relevant scientific articles. The focus of the ethnographic observation was

to gain a comprehensive qualitative understanding of our research questions, more specifically, what is the role of innovation hubs in the Tanzanian innovation system and how do they implement inclusive innovations?

The ethnographic observations for this research included multiple visits to 12 innovation hubs (10 in Dar es Salaam and 2 in Iringa) between October 2020 and January 2023 (see Table 1). These 12 innovation hubs provide a comprehensive overview of the Tanzanian innovation activities in practice. Additionally, 10 official semi-structured interviews were conducted with key actors in the Tanzanian innovation ecosystem to gain a comprehensive understanding of inclusive innovation processes in Tanzania. The interviewees included representatives from COSTECH, important donors for inclusive innovation such as the Human Development Innovation Fund (HDIF), as well as hub managers, CEOs, facilitators, directors of programmes, and other coordinators. The interviewee's selection was based on the authors' deep knowledge of Tanzanian innovation actors, as they have been researching and acting in the Tanzanian innovation system for more than a decade. In addition, a snowball sampling method was applied, in which through the initial participants the researcher will then identify additional study participants to form part of the sample. The themes of the interviews and observations were related, for example, to the physical environment and infrastructure, community and collaboration, Innovation activities and processes, events and programmes, resources and support structures, cultural and social dynamics, as well as outcomes and impacts of the hubs.

The interviews lasted approximately 60 min each, and with permission, they were recorded and later transcribed into Microsoft Word documents. Notes and photographs were taken during the ethnographic observation, and observation summaries were written immediately afterward in the research diary. In our ethnographic approach, we follow the general ethical guidelines of the European Science Foundation ALLEA - All European Academies (2011) *the European Code of Conduct for Research Integrity*, as well as several ethical guidelines for conducting ethnographic research in the Global South such as the American Anthropology Association *Statement on ethics* (2024) and UNIPID *Ethical guidelines for responsible academic partnership with the Global South* (Salas and Avento 2023). In Tanzania, the official research permit and ethical clearance were obtained through the COSTECH.

In our empirical analysis of Tanzanian innovation policy and its implementation in innovation hubs, we utilize the six levels of inclusion in innovation processes proposed by Heeks, Foster, and Nugroho (2014; see also Heeks et al. 2013). We categorize innovation hubs based on organizational structure, funding models, and operational frameworks into four distinct types: state-owned hubs, start-up incubators, university platforms, and inclusive innovation hubs. Additionally, we illustrate inclusive innovation activities with successful case examples and discuss the main challenges associated with the inclusive innovation approach.

### Socio-economic context of the innovation system in Tanzania

Tanzania, located in East Africa, is classified as a lower-middle-income country on a global scale. It stands out as one of the most rapidly growing nations in terms of both population and economy. With a current population of over 67 million, the country has experienced explosive population growth (UNFPA 2023; TSA 2023). It is projected that by 2035, the population will reach almost 90 million (NBS 2018). Approximately one-third of the population resides in urban areas, and the trend of rural-to-urban migration continues to rise. Following the adverse impact of COVID-19, Tanzania's economy is gradually recovering, with a projected real GDP growth rate of 4-5% (World Bank 2023). The economic success of Tanzania is primarily rooted in its strategic maritime location, abundant natural resources such as mining and natural gas reserves, a thriving construction industry, a growing tourism sector, and expanding trade and financing services. The Information and Communication Technologies (ICT) sector is also emerging; however, it currently contributes only 4.3% of total tax revenue and 1.5% of the GDP, down from the 2% it contributed in 2013 (GSMA 2023).

The income disparity between the impoverished majority and the affluent minority in Tanzania is extensive. A significant 34% of Tanzanians lived below the World Bank poverty line, which amounts to \$3.65 a day with the Gini index, a measure of income inequality, standing at 40.5 (World Bank 2018). Economic development in the country is largely concentrated in urban areas, creating capital-intensive opportunities that offer limited economic prospects for the impoverished majority. Agriculture, as the most labour-intensive sector, provides job opportunities for the uneducated rural population. However, its economic impact has been limited, and exports primarily consist of raw materials. While Tanzania has maintained socio-political stability, one of its strengths, and concerns remain regarding how to actively engage the large poverty-stricken population in the country's development efforts. In 2021, Tanzania ranked 160th out of 190 countries in the United Nations Development Programme's Human Development Index (UNDP 2021). This ranking reflects the country's ongoing challenges in achieving significant progress in various socio-economic indicators.

Since the mid-1990s, Tanzania has undertaken a gradual dismantling of its socialist structures from the past, including state control, monopolies, and heavily regulated production systems. One notable milestone in this process was the launch of the Tanzania Science and Technology Policy in 1996. These reforms have led to macroeconomic stabilization, accelerated economic growth, and the establishment of policies and institutions crucial for the development of the national innovation system, although it is still in its nascent stages (Diyamett and Mutambla 2014; Hooli, Jauhiainen, and Lahde 2016). The coordination and planning of innovation and technology policies in Tanzania fall under the responsibility of the President's office, the Planning Commission, and the Ministry of Information, Communication & Information

**Table 1:** Innovation hubs involved in our empirical research.

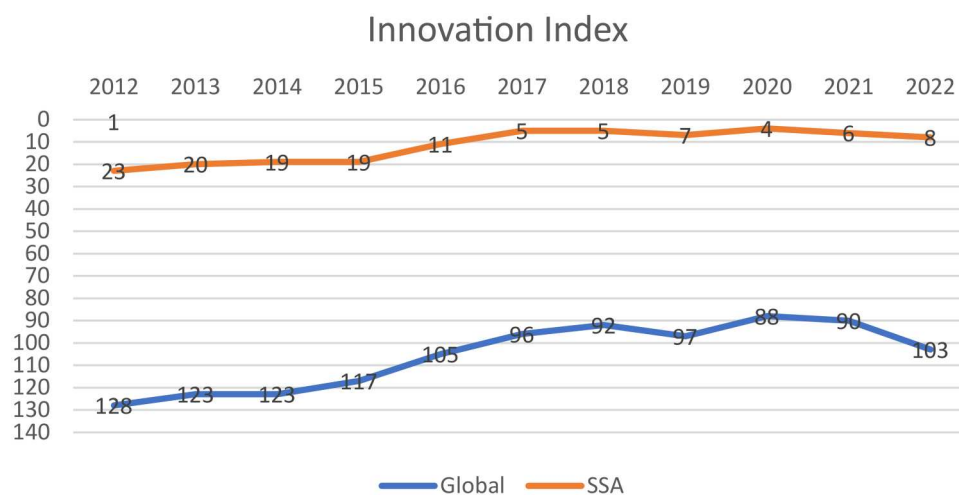
Innovation hub	Objective	Inclusive innovation	Organizational form
Buni Innovation Hub	Fostering innovation	Not primary objective	Government
Dar Teknohama Business Incubator	Business incubation	Not primary objective	Government
Sahara Accelerator	Business acceleration	Not primary objective	Private
Ndoto Hub	Women empowerment	Through social challenges	NGO
Y4C Innovation Hub	Innovation for children	Through social challenges	University
SmartLab	University-corporate	Not primary objective	Private
dLab	Data and innovation	Through social challenges	NGO
UDSM ICT incubator	Business incubation	Through social challenges	University
Seedspace Dar es Salaam	Entrepreneurship hub	Not primary objective	Private
Safe Space Co.	Mental health services	Not primary objective	NGO
Rlabs Iringa	Community development	Primary objective	NGO
Kiota hub	Fostering innovation	Not primary objective	University

Technology (MoEST). However, government implementation activities have been slow and fragmented, with unclear roles, mandates, and responsibilities among government bodies.

The first half of the 2010s marked a significant period for the development of the Tanzanian innovation environment, largely due to several innovation-focused development projects funded by the international community taking place simultaneously. Among the most noteworthy projects was The Information Society and ICT Sector Development Project in Tanzania (TANZICT), a project aimed at strengthening the Tanzanian innovation ecosystem (2011–2015) funded by the Government of Finland (Hooli, Jauhiainen, and Lahde 2016), and HDIF, funded by the development aid of the United Kingdom. The fund supported innovations with societal impacts in education, water, health, sanitation, and hygiene (Hooli and Jauhiainen 2020). These projects sparked an emerging innovation boom in the country, resulting in the establishment of the first innovation hubs and living labs, the organization of the first annual National Innovation Week, and the emergence of a significant number of startup companies. According to the Tanzania Startup ecosystem status report (2023), in recent years the country witnessed an increase in the number of startups from 673 in 2022 to 842 in 2023. Dar es Salaam has the highest concentration of startups, as more than 65% of

new startups are residing there. Importantly, these projects also raised awareness about the knowledge economy and innovation among entrepreneurs, universities, and government members. The surge in innovation activities was reflected in the regional and global Innovation Index, where Tanzania's ranking saw an upward trend (WIPO 2022). However, following the completion of these projects, the momentum of innovation initiatives has subsided, leading to a decline in the country's ranking in the innovation index. As of 2022, Tanzania was ranked as the 103rd most innovative country globally and the 8th most innovative country in sub-Saharan Africa (see Figure 1).

Tanzanian innovation system is still emerging and faces several challenges, particularly related to organizational and institutional capacity. There is a significant lack of human capital and skilled individuals who understand the systematic development of innovations or have the technological capability to develop innovations in areas such as software, Fintech, AI, machine learning, or robotics. (Debrah, Oriaghe-Oseghale, and Adams 2018) Insufficient investments in innovation development and technology infrastructure persist, with only 0.3% of GDP directed towards research and development. The innovation system suffers from poor coordination, a lack of commitment and resources, and a limited understanding of how to foster national competitiveness and

**Figure 1:** Tanzania ranking in Global and Sub-Saharan Africa (SSA) Innovation Index (WIPO 2022).

socio-economic development through innovation. There is a shortage of new startup companies, business incubation support, and adequate funding resources (Anderson 2017; Nkwabi and Mboya 2019). Key legislation, such as intellectual property acts and regulations to protect innovations are enacted, although, the implementation of several policies remains inadequate. The education system's level is still relatively low, with universities conducting limited academic research, and cooperation between research institutes and the private sector is nearly non-existent (Anangisye and Fussy 2014).

### **Tanzanian innovation policies**

The main socio-economic document in Tanzania is the *Tanzanian Development Vision 2025*, which was launched in 1995. This vision is implemented through five-year development plans, with the current plan being the *Third Development Plan* covering the years 2021/22–2025/26. The primary objective of this plan is to accelerate Tanzania's development towards becoming a middle-income country with industrialization and a high quality of living. A key focus of the Development Plan is the investment in science, technology, and innovation to develop existing economic sectors and create new ones.

There are several other relevant policies for innovation development in Tanzania, including the *National ICT Policy* (renewed in 2016), the *SME policy* (2003), the *Science and Technology Policy* (1996), the *ICT Education Policy* (2007), the *Tanzania Inclusive National Entrepreneurship strategy* (2017), the *Research and Development Policy* (2020), and the *National Guideline to Identify and Promote Inventions, Innovations and Traditional Knowledge Practices* (2020). For a long time, the government has planned to publish a comprehensive national innovation policy framework (Hooli, Jauhainen, and Lahde 2016). Finally, in August 2022, a draft of the NIF was published by COSTECH under the MoEST. COSTECH has a coordinating and promotional role in innovation, science, and technology development and utilization activities in Tanzania.

The main objective of the NIF is to provide a structured approach for designing, implementing, documenting, and measuring the key performance of different actors in the Tanzanian innovation ecosystem (MoEST 2022, 3). The document, consisting of 81 pages, focuses on four strategic areas (MoEST 3–4): (1) establishing an integrated and coordinated national innovation system by identifying structures and key actors involved in innovations; (2) promoting accountability among innovation governing institutions and encouraging their responsibilities; (3) developing a national innovation roadmap that includes defined priorities for innovation adoption, promotion, acceleration, and investment; and (4) strategic innovation financing to address appropriate funding for innovation development at different levels.

In general, the NIF effectively explains the basic concepts of innovation and the innovation system, recognizing the need for systematic interactions to foster innovation creation (MoEST 2022). However, there is a lack of clarity regarding how these universal ideas of innovation will be contextualized in Tanzania. The

framework inadequately reports and discusses the identification of local actors, their roles, and specific policy measures or financial considerations in a very general manner. Additionally, the document fails to analyze the missing actors, interactions, institutions, finances, and organizations that are crucial for establishing a well-functioning innovation system in Tanzania.

### **Inclusive innovation processes in Tanzanian innovation policy**

The NIF strongly emphasizes the significance of inclusive innovations for Tanzanian socio-economic development. Spatially, the framework is structured into four strategic levels, each with its specific objectives: grassroots level (community-driven), semi-urban and urban level (private sector-driven), national level (public sector-driven), and regional and global level (partnership-driven). Inclusive innovations are particularly discussed in the sections focusing on grassroots-level innovation processes, as well as in the section concerning semi-urban and urban-level innovation processes.

According to the NIF, grassroots-level innovation processes will lead to community-led solutions for complex sustainability issues that benefit the local community but are challenging to scale or disseminate beyond their original context (MoEST 2022, 22). These need-based innovations aim to address everyday challenges in communities, including improvements in agricultural productivity, access to knowledge and new skills, as well as tackling various health and livelihood challenges. The framework also highlights the importance of endogenous knowledge as part of the innovation process. To support grassroots-level innovation development, the framework suggests investing in high-quality education at the primary and vocational levels to ensure the development of human capital. While the framework does not precisely define how the education system needs to be improved, it mentions the need for a focus on challenge-based learning and emphasizes the importance of digital skills.

The NIF emphasizes innovation hubs as the main environments for developing inclusive and grassroots innovations (MoEST 2022, 25). Similarly, the National Economic Empowerment Council, in its Inclusive National Entrepreneurship Strategy, considers the role of innovation hubs essential for inclusive innovations. It aimed that Tanzania would have 50 functional innovation hubs, living labs, incubators, and innovation forums in the country by 2021 (NEEC 2017). The NIF emphasizes the need for leadership from local government authorities to ensure inclusive innovation development (MoEST 2022, 24). However, it acknowledges that these authorities require support and empowerment, along with the necessary skills and knowledge to lead this process. In reality, according to the interviews, local government authorities have been more focused on restricting and increasing bureaucracy for grassroots innovation development than promoting those. The framework does not provide concrete suggestions for improving the finances of inclusive innovations. It states the importance of allocating specific funds from the national budget to support grassroots innovations (MoEST 2022, 27). Realistically, it is expected that the primary funding

for the development of grassroots innovations in Tanzania will come from international development partners, and to a limited extent, from the private sector.

Inclusive innovations are also emphasized in the urban-level innovation system. Its main objective is to produce solutions for social, governmental, economic, and environmental challenges in urban and semi-urban environments (MoEST 2022, 28). The main actors emphasized here are from the private sector. An urban innovation system is also expected to create value for grassroots communities and at the national level by generating employment and livelihood opportunities and accelerating economic growth. As an example of an urban innovation system, the innovation framework names Silicon Dar. Silicon Dar is an emerging technology district of Dar es Salaam. It is located at one of the main entrances to the city and it comprises several innovation hubs, data centres, the College of ICT, COSTECH, and tech startups. In the section on the urban innovation system, the NIF recognizes the need for an inclusive approach accenting the role of communities (MoEST 2022, 30). It states that there is a need to ensure that not only specific privileged groups are benefiting from the urban innovations but also residents, especially in disfranchised neighbourhoods.

### **Innovation hubs in Tanzanian**

Over the past decade, Tanzania has witnessed significant growth in the number of innovation hubs. Currently, over 40 innovation hubs are operating in the country, and this figure continues to rise (HDIF 2022). The emergence of new hubs signifies a growing recognition of innovation and entrepreneurship in Tanzania and the desire to create a supportive ecosystem for these endeavours. However, it is important to note that the innovation hub landscape is characterized by significant fluctuation. While it is relatively easy to establish new hubs, sustaining adequate funding and coordinators with appropriate know-how has proven to be a challenge (Mwantimwa et al. 2021). Efforts to establish and support these hubs require not only the establishment of physical spaces but also the provision of long-term financial support, human capital, and conducive environments for collaboration, knowledge sharing, and entrepreneurship. As a result, while new hubs are being opened, many existing ones become inactive or are forced to close.

The distribution of innovation hubs in Tanzania is rather uneven. The majority of hubs, more than 20, are concentrated in the bustling city of Dar Es Salaam (see Figure 2). Within Dar Es Salaam, a notable cluster of around 10 hubs is established in the emerging technology district Silicon Dar. Additionally, there are several innovation hubs located in Arusha, the economic centre of the northeast region, as well as in Dodoma, the official capital of Tanzania. In contrast, innovation hubs in other parts of the country are scattered randomly.

The innovation hubs involved in this research exhibit variations in their organizational structure, funding models, and operational frameworks, which can be classified into four different categories (Table 1). These hubs have been driven by various stakeholders, including government entities, private organizations, academic

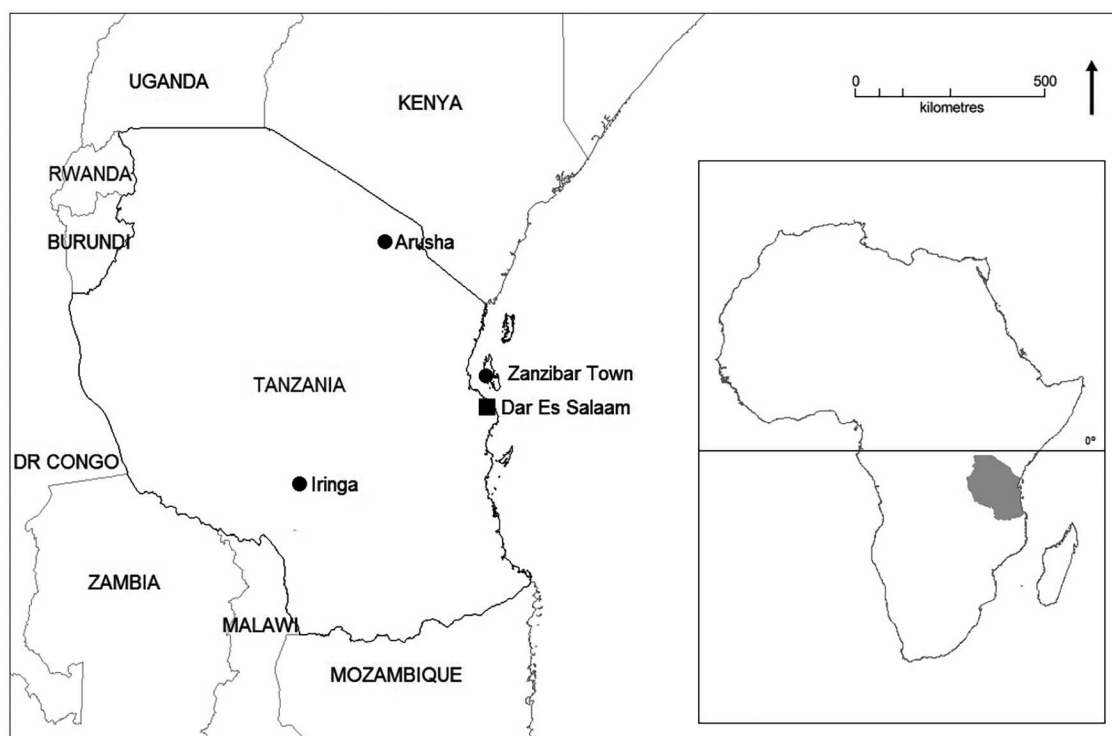
institutions, and international development programmes. *The first* category comprises government-organized hubs, exemplified by the Buni innovation hub. The history of innovation hubs in Tanzania is relatively young, with the pioneering hub, Buni innovation hub, being established in 2011 through the TANZICT project. Following the conclusion of TANZICT, Buni was adopted by COSTECH and is currently operated by the Tanzanian government. Buni innovation hub focuses on coordinating, supporting, and implementing the government's innovation policy in Tanzania. It operates under the government's mandate to promote and coordinate activities related to science, technology, innovation, and entrepreneurship throughout the country. The remaining hubs belong to a more recent wave of establishments, with a majority of them being founded within the past five years.

*The second* category of innovation hubs in Tanzania includes entities such as Dar Teknohama Business Incubator (DTBi) and Sahara Accelerator, which have a specific emphasis on promoting and nurturing the growth of emerging technology start-ups. These hubs target young university students and post-graduates who possess a keen interest in entrepreneurship. DTBi and Sahara Accelerator are particularly focused on providing incubation support to early-stage technology companies. Among these, Sahara Accelerator stands out as one of the most successful innovation hubs in the country. It plays a pivotal role in supporting start-ups whose business ideas are specifically aimed at addressing the significant societal challenges faced by Tanzania. Sahara Accelerator specializes in accelerating post-revenue start-ups and manages corporate or development funder-sponsored acceleration programmes. These programmes offer a range of resources, including co-working spaces, technical support, and access to potential investors.

*Thirdly*, there are innovation hubs that have direct affiliations with universities. Examples of such hubs include the UDSM- ICT Incubator Center, which aims to enhance collaboration between the academy and private sector, as well as facilitate practical training for students. It aims to accelerate economic growth by fostering innovation and entrepreneurship among students and researchers. It provides resources, mentorship, and support to transform academic knowledge and scientific research into viable business ventures. Tanzania Data Lab (dLab), on the other hand, focuses on utilizing data to address sustainable development challenges and economic growth. By leveraging data-driven approaches, dLab aims to generate innovative solutions that can contribute to the country's socioeconomic progress. *Lastly*, there are innovation hubs such as Ndoto Hub and Rlabs Iringa that specifically target inclusive innovations, aiming to empower vulnerable groups within communities, such as women, children, and unemployed youth.

### ***The inclusive innovation activities in Tanzanian innovation hubs***

Among the 12 innovation hubs included in this study, only five hubs explicitly prioritize inclusive innovation



**Figure 2:** Map of Tanzania showing the most important towns for innovation hubs.

activities as a central part of their curriculum. These hubs, namely Ndoto Hub, Y4C, dLab, UDSM ICT Incubation, and RLabs Iringa, have demonstrated a commitment to inclusive innovation. It is noteworthy that as a government-funded innovation hub, Buni innovation hub should have played a significant role in promoting inclusive innovation, as emphasized in the National Innovation Framework (MoEST 2022, 25). While Buni hub focuses on discovering, nurturing, and mentoring youth interested in entrepreneurship, technology, and innovation, our observations revealed that they lacked specific programmes dedicated to inclusive innovations, and it was not included in their strategy.

The RLabs Iringa stands out as the most impactful innovation hub examined in this research. Located in a small town in the southern highlands, RLabs Iringa has successfully adopted and franchised the inclusive innovation model pioneered by RLabs South Africa, which is widely recognized as one of the most successful inclusive innovation hub models globally (Parker, Wills, and Wills 2013; Wills, Parker, and Wills 2015). Originally established in Cape Town in 2009, RLabs has expanded its reach to 23 countries across five continents, solidifying its reputation as a non-profit organization dedicated to empowering marginalized members of society and fostering inclusive innovation (RLabs 2023).

One notable inclusive innovation initiative of RLabs is the Grow Leadership program, which specifically targets unemployed youth without proper education. This program places a strong emphasis on capacity enhancement, providing training in IT, business, entrepreneurship, and essential life skills. By instilling confidence and capacity building, the program aims to support participants to discover meaningful paths for their future.

According to an internal survey conducted by RLabs in 2021, the Grow Leadership program trained 280 participants between 2014 and 2019. Respondents reported improved resource identification, increased confidence in approaching customers, better time and money management, enhanced innovation, and improved competitiveness. Building on the success of the Grow Leadership program, RLabs Iringa is currently organizing the Grow Next Level program, aimed at further strengthening and expanding young people's businesses while increasing their income.

During recent years, together with several partners, RLabs Iringa has significantly scaled up the Growth Leadership Academy and the number of participants has rapidly expanded. Through collaborations with organizations such as COSTECH, UNICEF, HDIF, Egmont Trust, Segal Family Foundation, and Botnar, RLabs Iringa managed to train 11 846 youths in the Grow Leadership program between 2020 and 2022. The main success was done under the project *the Girls Reproductive Health, Rights, and Empowerment Accelerated* project GRREAT, funded by United Nations Children's Fund (UNICEF) Tanzania (UNICEF 2023). In this project, RLabs Iringa reached 10,500 young adolescent girls in the Mbeya region within a span of three years. According to their own statistic, 48% of participants established their own businesses during and after the academy. By building upon their successful small-scale model, RLabs demonstrated the effectiveness of their approach on a larger scale.

Sahara Accelerator fosters inclusive innovation through a partnership with community-based organizations, non-governmental organizations, international donor communities, and private foundations. The hub

operates through three sub-accelerator programmes: corporate-sponsored, venture-backed, and impact-centred acceleration programmes. The impact-centred accelerator program stands out as a crucial avenue for inclusive innovation, as it focuses on developing solutions with transformative impact in local communities.

An exemplary initiative within the impact accelerator program is the AMUA accelerator, which aims to facilitate co-creation processes to address maternal and sexual health challenges faced by individuals living with disabilities. One outcome of the AMUA accelerator is the Frenclicom-platform, which effectively translates sign language to text and vice versa. This technology enhances communication between healthcare workers and individuals with disabilities, making healthcare services more accessible and inclusive.

Another example of Sahara Accelerator's inclusive innovation activity is a startup MaishaPackage, which they incubated from idea to impact. MaishaPackage is a startup that promotes sexual and reproductive health and women's hygiene. The startup works with young women's groups to provide essential sexual education and awareness while supporting them with socio-economic activities. Through the training, the target group gains access to age-appropriate information. Most of these young women face financial difficulties in meeting their basic needs, so MaishaPackage provides them with knowledge on making reusable sanitary pads. The women receive technical expertise and a starter pack that includes equipment for preparing the pads.

The Y4C hub established collaboration with UNICEF and the University of Dar es Salaam to create a platform that facilitates engagement between university students and local communities. This platform catalyzes university projects aimed at finding innovative solutions to pressing societal challenges. Through hackathons and design thinking workshops, Y4C empowers students to think creatively and develop practical solutions that can drive positive change. An illustrative example of Y4C's impactful activities is their support for teachers in implementing the competence-based curriculum introduced by the government.

Y4C provided a supportive environment through an application called StadiBox, a comprehensive platform designed to support teachers in integrating life skills education within pre and primary education. It aims to address the challenge of teachers in incorporating life skills teachings into the curriculum effectively. The StadiBox platform comprises two main components: a web-based application and a mobile application. Teachers using StadiBox can create activities categorized by life skills, with detailed descriptions, durations, participant requirements, necessary resources, and accompanying images. This facilitates the easy implementation of these activities within lessons. Additionally, teachers can engage with each other, fostering collaboration and inclusion. StadiBox aims to provide a user-friendly platform for educators to enhance students' life skills alongside academic learning, thereby preparing them to tackle various challenges they may encounter in their lives.

Lastly, Ndoto Hub has a comprehensive range of programmes and services designed to support and nurture

(young) women entrepreneurs. These include providing a co-working space, personalized counselling sessions, business development support, and networking opportunities. By focusing specifically on women and girls, Ndoto Hub addresses the historical underrepresentation of women in Tanzania's science, technology, and innovation fields (see example Masanja 2010). Ndoto Hub goes beyond traditional entrepreneurship training by organizing entrepreneurship-related events and offering a diverse array of training programmes. These initiatives aim to enhance participants' entrepreneurship, business development, and leadership skills. Additionally, Ndoto Hub actively fosters connections between women entrepreneurs and essential resources such as financing options, markets, sustainable value chains, and supply chains. By facilitating these connections, the hub creates opportunities for women entrepreneurs to access the necessary support and networks required for their business growth and success.

### ***Challenges in the inclusive innovation approach in Tanzanian innovation hubs***

We identified numerous reasons and challenges that contribute to the lack of prioritization and limited engagement in inclusive innovation activities within certain innovation hubs. The most common reasons reported include inadequate funding and a lack of knowledge or understanding regarding how to effectively integrate inclusive innovation approaches into their strategies and programmes. The majority of these innovation hubs heavily rely on external funding, which often comes with specific requirements and conditions set by the funders. This dependency significantly limits the hubs' autonomy and their ability to shape their activities according to their vision and goals. Instead, they are often constrained by the preferences and priorities of their primary financiers. As stated by Chataway and colleagues (2014), the dominant discourse surrounding innovation is largely influenced by large organizations and corporations who shape the direction and beneficiaries of innovation efforts based on their own interests and market demands.

Several interviewed stakeholders expressed concern over a general lack of understanding regarding the concept of inclusive innovation. In many interviews, inclusive innovation was solely related to social charity and voluntary work with NGOs, rather than recognizing its broader significance. The perception of inclusive innovation was often limited to its association with people with disabilities or children with special needs, rather than viewing it as a comprehensive approach that includes grassroots communities and addresses their everyday sustainability challenges. This narrow understanding hinders the recognition of grassroots communities as key stakeholders and the primary beneficiaries of inclusive innovation activities (see also Papaioannou 2018).

Furthermore, the uncertainty surrounding the successful outcome and the time required for piloting, testing, and prototyping were identified as significant challenges. In many cases, investors expect quick returns on their investments, which creates a mismatch with the longer time-frame often necessary for inclusive innovative projects

to mature and demonstrate their full potential. This misalignment in expectations poses a barrier to securing investment for inclusive innovation initiatives, as the need for patience and a willingness to invest in longer-term impact may not align with the demands for immediate financial returns.

### Discussion and conclusion

Inclusive innovation has emerged as a critical development practice aimed at empowering marginalized communities in the Global South and driving their socio-economic advancement. It has garnered significant attention in both transnational and national development strategies and policies, with specific emphasis placed on it in SDG9 of the UN's 2030 Development Goals. While transformative innovation has become a broad umbrella concept encompassing various approaches to promote sustainable development, the concept of inclusive innovation is necessary due to its narrower focus and strong emphasis on including marginalized communities in the innovation processes.

Furthermore, as highlighted by Heeks, Foster, and Nugroho (2014), achieving inclusion in innovation activities encompasses distinct levels, extending beyond the mere development of new technological products for the underserved. It necessitates the establishment of inclusive structures and post-structures that empower communities and facilitate their active participation in their own social and economic development (Earl et al. 2023). Despite these crucial aspects, there remains a limited comprehensive scientific understanding of how inclusive innovations are integrated into national policies and effectively implemented in practice. Our research contributes to the existing literature by highlighting the necessity for a comprehensive and systematic understanding of the nexus between top-down strategy and bottom-up implementation of inclusive innovation. We illustrate this through a case study of inclusive innovation development in Tanzania.

To answer our first research question, we discovered that Tanzania is making notable strides toward the establishment of a policy framework for innovation development. Our findings reveal a gradual emergence of policies and strategies that address the country's need to transition into a knowledge society. Significantly, the recently proposed draft of the NIF stands out as the first comprehensive strategy document designed to establish the essential institutions and organizations required for an effective innovation system in Tanzania. Within this framework, inclusive innovations play a pivotal role, and their importance is underscored in the development of both grassroots and urban-level innovation systems. These levels serve as the primary arenas for practical innovation activities to thrive, emphasizing the crucial role played by local communities and urban centers in fostering innovation.

However, the NIF falls short in providing a comprehensive vision for structurally and systematically incorporating inclusive innovation into community development, specifically aiming to achieve inclusion at the structure (Level 5) or post-structure (Level 6) as

defined in Heeks, Foster's, and Nugroho's taxonomy (2014). While the NIF acknowledges the effectiveness of innovation hubs in fostering inclusive innovation, it fails to outline the replication of best practices, define the coordinating entities responsible for inclusive innovation activities, and establish a sustainable funding mechanism for such endeavors. Consequently, there is a significant risk that the objectives of the NIF will only achieve the inclusion of intention at level 1. To address this, Tanzania's innovation framework requires a more coordinated approach with clear steering and a dedicated budget. However, there is a potential danger that increased government involvement may lead to unnecessary regulations, a top-down approach, and limitations on the flexibility and agility of innovation actors to promote inclusive innovation.

So far, international development partners have played a pivotal role in establishing and nurturing Tanzania's innovation system, particularly in fostering inclusive innovation-related structures. The impact of these initiatives on Tanzania's innovation environment has been tremendous, especially in their support for policy development, the establishment of innovation hubs, and the facilitation of significant events like national innovation week. However, it is noteworthy that the dedicated development projects aimed solely at fostering an innovation environment in Tanzania have now reached completion. It is not coincidental that Tanzania's previous ascent, as well as its subsequent decline, in the Global Innovation Index, aligns with the lifecycle of these projects. Presently, donor priorities are shifting towards more sustainable development-oriented endeavors, which may still encompass inclusive innovation-related themes but no longer have a direct focus on the advancement of the innovation system.

To address our second research question, our research discovered a burgeoning array of diverse innovation hubs in Tanzania. Despite varying user groups and strategic objectives, these hubs offer tangible platforms for local communities to actively engage in innovation activities, thereby fostering inclusive innovation. Innovation hubs are characterized by their flexible and agile organizational structures, boast low fixed costs, and promising opportunities for generating income. Moreover, they possess the capacity to effectively address the societal challenges faced by communities in a rapidly changing landscape of Southern African socio-economic dynamics, influenced by changes such as population growth, technological advancements, and urbanization.

Innovation hubs can achieve inclusion of the process (Level 4) in their activities. Notwithstanding, inclusive innovation receives relatively low priority on the agendas of innovation hubs. Out of the 12 hubs involved in this study, only five explicitly incorporated inclusive innovation into their strategic plans. Furthermore, even among these hubs, the understanding of what inclusive innovation truly entails remained rather limited. These existing hubs operated in isolation, lacking meaningful interactions, coordinated capacity-building efforts, or network activities with one another. Consequently, the responsibility for such activities fell largely on

development partners, leaving a void once innovation-focused development projects reached completion. Unfortunately, there has been a conspicuous absence of entities willing to assume the responsibility for broader coordination and capacity building of Tanzanian innovation hubs.

Amidst these challenges, Rlabs Iringa stands out as an exemplary model for incorporating inclusive innovation activities as an integral part of local innovation hub operations. Its success is particularly encouraging given that the model originated in South Africa, where Rlabs has already achieved organizational stability and demonstrated the adaptability of its concept to be applied in different geographical contexts. Moreover, Rlabs Iringa has successfully scaled its local activities and made a remarkable impact on its community. Therefore as a policy recommendation, to achieve structural and post-structural inclusion in Tanzania, concerted efforts should be made to systematically replicate Rlabs Iringa's operational model in several other locations across the country. By doing so, Tanzania can leverage the proven effectiveness of Rlabs' approach and extend the benefits of inclusive innovation to more communities, fostering sustainable development and empowering individuals throughout the nation.

#### Disclosure statement

No potential conflict of interest was reported by the authors.

#### ORCID iD

Lauri Hooli  <http://orcid.org/0000-0002-7055-2818>

#### References

- Al-Jayyousi, O., H. Amin, H. A. Al-Saudi, A. Aljassas, and E. Tok. 2023. "Mission-Oriented Innovation Policy for Sustainable Development: A Systematic Literature Review." *Sustainability* 15 (17): 13101. doi:10.3390/su151713101.
- American Anthropology Association. 2024. "Statement on Ethics." [Online]. Accessed May 20, 2024. <https://americananthro.org/about/anthropological-ethics/>.
- Anangisye, W. A., and D. Fussy. 2014. "Tanzania: Revisiting Eastern and Central African Education Systems." In *Education in East and Central Africa*, edited by C. Wolhuter, 373–398. London: Bloomsbury Academics.
- Anderson, W. 2017. "Factors Affecting Small & Medium Enterprises (SMEs) Start-up Growth in Tanzania." *The Pan-African Journal of Business Management* 1 (1): 1–26.
- Asheim, B. T., M. Grillitsch, and M. Trippel. 2016. "Regional Innovation Systems: Past–Present–Future." In *Handbook on the Geographies of Innovation*, edited by R. Shearmur, C. Carrincazeaux, and D. Doloreux, 45–62. Cheltenham: Edward Elgar Publishing. doi:10.4337/9781784710774.00010.
- Arocena, R., and J. Sutz. 2003. "Inequality and Innovation as Seen from the South." *Technology in Society* 25 (2): 171–182. doi:10.1016/S0160-791X(03)00025-3.
- Arocena, R., and J. Sutz. 2014. "Innovation and Democratization of Knowledge as a Contribution to Inclusive Development." In *National Innovation Systems, Social Inclusion and Development – The Latin American Experience*, edited by G. Dutrénit and J. Sutz, 15–33. Cheltenham: Edward Elgar Publishing. doi:10.4337/9781782548683.00006.
- AU (African Union). 2013. *Agenda 2063*. Accessed May 20, 2023. <https://au.int/>.
- Bryden, J., S. S. Gezelius, K. Refsgaard, and J. Sutz. 2017. "Inclusive Innovation in the Bioeconomy: Concepts and Directions for Research." *Innovation and Development* 7 (1): 1–16. doi:10.1080/2157930X.2017.1281209.
- Chataway, J., R. Hanlin, and R. Kaplinsky. 2014. "Inclusive Innovation: An Architecture for Policy Development." *Innovation and Development* 4 (1): 33–54. doi:10.1080/2157930X.2013.876800.
- Chesbrough, H. W. 2003. *Open Innovation: The New Imperative for Creating and Profiting from Technology*. New York: Harvard Business Press.
- Chesbrough, H. W., and M. M. Appleyard. 2007. "Open Innovation and Strategy." *California Management Review* 50 (1): 57–76. doi:10.2307/41166416.
- Debrah, Y. A., R. Oriaghe-Oseghale, and K. Adams. 2018. "Human Capital, Innovation and International Competitiveness in Sub-Saharan Africa." In *Africa's Competitiveness in the Global Economy*, edited by I. Adeleye, and M. Esposito, 219–248, AIB Sub-Saharan Africa (SSA) Series. London: Palgrave Macmillan.
- Desta, T. 2018. "ICT Innovations, Entrepreneurship and Hubs in East Africa: The Case of Ethiopia." *African Journal of Science, Technology, Innovation and Development* 10 (6): 655–664. doi:10.1080/20421338.2018.1473064.
- Diercks, G., H. Larsen, and F. Steward. 2019. "Transformative Innovation Policy: Addressing Variety in an Emerging Policy Paradigm." *Research Policy* 48 (4): 880–894. doi:10.1016/j.respol.2018.10.028.
- Diyamett, B., and M. Mutambla. 2014. "Foreign Direct Investment and Local Technological Capabilities in Least Developed Countries: Some Evidence from the Tanzanian Manufacturing Sector." *African Journal of Science, Technology, Innovation and Development* 6 (5): 401–414. doi:10.1080/20421338.2014.983305.
- Dutilleul, B., F. A. Birrer, and W. Mensink. 2010. "Unpacking European Living Labs: Analysing Innovation's Social Dimensions." *Central European Journal of Public Policy* 4(1): 60–85.
- Earl, E. L., C. De Fuentes, J. Kinder, and R. S. Schillo. 2023. "Inclusive Innovation and How It Can Be Measured in Developed and Developing Countries." In *Handbook of Innovation Indicators and Measurement*, edited by F. Gault, A. Arundel, and E. Kraemer-Mbula, 297–322. Cheltenham: Edward Elgar Publishing.
- Edquist, C. 2005. "System of Innovation: Perspectives and Challenges." In *The Oxford Handbook of Innovation*, edited by J. Fagerberg, D. C. Mowery, and R. R. Nelson, 181–208. Oxford: Oxford University Press.
- European Science Foundation ALLEA – All European Academies. 2011. *The European Code of Conduct for Research Integrity*. [Online]. Accessed June 4, 2024. [https://www.allea.org/wp-content/uploads/2015/07/Code\\_Conduct\\_ResearchIntegrity.pdf](https://www.allea.org/wp-content/uploads/2015/07/Code_Conduct_ResearchIntegrity.pdf).
- Fagbemi, F., and J. O. Ajibike. 2024. "Sustainable Poverty Reduction in Nigeria: Does Process Innovation Matter?" *Journal of the Knowledge Economy*. Advance online publication. doi:10.1007/s13132-024-01940-x.
- Friederici, N. 2016. "Innovation Hubs in Africa: Assemblers of Technology Entrepreneurs." PhD Thesis, Oxford University, UK.
- Gandini, A. 2016. *The Reputation Economy: Understanding Knowledge Work in Digital Society*. London: Springer. doi:10.1057/978-1-137-56107-7
- George, G., R. K. Merrill, and S. J. Schillebeeckx. 2021. "Digital Sustainability and Entrepreneurship: How Digital Innovations are Helping Tackle Climate Change and Sustainable Development." *Entrepreneurship Theory and Practice* 45 (5): 999–1027. doi:10.1177/1042258719899425.
- GSMA (Global System for Mobile Association). 2023. "Tanzania Digitalisation Journey Opportunities for Value

- Creation.” London: GSMA. Accessed June 15, 2023. <https://www.gsma.com/>.
- Gupta, A. K., A. R. Dey, C. Shinde, H. Mahanta, C. Patel, R. Patel, N. Sahay, et al. 2016. “Theory of Open Inclusive Innovation for Reciprocal, Responsive and Respectful Outcomes: Coping Creatively with Climatic and Institutional Risks.” *Journal of Open Innovation: Technology, Market, and Complexity* 2 (3): 16. doi:10.1186/s40852-016-0038-8.
- Haddad, C. R., V. Nakić, A. Bergek, and H. Hellsmark. 2022. “Transformative Innovation Policy: A Systematic Review.” *Environmental Innovation and Societal Transitions* 43: 14–40. doi:10.1016/j.eist.2022.03.002.
- HDIF (Human Development Innovation Fund Tanzania). 2022. “Catalysing and Scaling Innovation in Tanzania: A Review of Approaches.” Accessed June 15, 2023. Available at: <http://hdif-tz.org/>.
- Heeks, R., M. Amalia, R. Kintu, and N. Shah. 2013. “Inclusive Innovation: Definition, Conceptualisation and Future Research Priorities.” IDPM Development Informatics Working Paper no.53, University of Manchester, UK.
- Heeks, R., C. Foster, and Y. Nugroho. 2014. “New Models of Inclusive Innovation for Development.” *Innovation and Development* 4 (2): 175–185. doi:10.1080/2157930X.2014.928982.
- Hooli, L., J. S. Jauhiainen, and K. Lahde. 2016. “Living Labs and Knowledge Creation in Developing Countries: Living Labs as a Tool for Socio-Economic Resilience in Tanzania.” *African Journal of Science, Technology, Innovation and Development* 8 (1): 61–70. doi:10.1080/20421338.2015.1132534.
- Hooli, L. J., and J. S. Jauhiainen. 2018. “Building an Innovation System and Indigenous Knowledge in Namibia.” *African Journal of Science, Technology, Innovation and Development* 10 (2): 183–196. doi:10.1080/20421338.2018.1436737.
- Hooli, L. J. 2024. “Private-sector Innovation Processes in Development Cooperation: Perspectives from Finnish Technology Enterprises.” *Innovation and Development* 14:1–24. doi:10.1080/2157930X.2021.1979719.
- Jakonen, M., N. Kivinen, P. Salovaara, and P. Hirkman. 2017. “Towards an Economy of Encounters? A Critical Study of Affectual Assemblages in Coworking.” *Scandinavian Journal of Management* 33 (4): 235–242. doi:10.1016/j.scaman.2017.10.003.
- Jiménez, A. 2019. “Inclusive Innovation from the Lenses of Situated Agency: Insights from Innovation Hubs in the UK and Zambia.” *Innovation and Development* 9 (1): 41–64. doi:10.1080/2157930X.2018.1445412.
- Joseph, K. J. 2014. “Exploring Exclusion in Innovation Systems: Case of Plantation Agriculture in India.” *Innovation and Development* 4 (1): 73–90. doi:10.1080/2157930X.2014.890352.
- Takeu, C. B. P., C. M. Wendji, C. Z. Kouhomou, and G. C. M. Kamdoun. 2024. “Can Technological Innovations Contribute to More Overcome the Issue of Poverty Reduction in Africa?” *Technology in Society* 76: 102463. doi:10.1016/j.techsoc.2024.102463.
- Kaplinsky, R. 2014. ““Bottom of the Pyramid” Innovation and Pro-Poor Growth.” In *Making Innovation Policy Work: Learning from Experimentation*, edited by M. Dutz, Y. Kuznetsov, E. Lasagabaster, and D. Pilat, 49–70. Paris: OECD.
- Krause, U. 2013. “Innovation: The New Big Push or the Post-Development Alternative?” *Development* 56 (2): 223–226. doi:10.1057/dev.2013.29.
- Lee, N. 2023. “Inclusive Innovation in Cities: From Buzzword to Policy.” *Regional Studies*, February, 1–12. doi:10.1080/00343404.2023.2168637.
- Lundvall, B.-Å., J. Vang, and K. J. Joseph. 2009. “Innovation System Research and Developing Countries.” In *Handbook of Innovation Systems and Developing Countries*, edited by BÅ Lundvall, K. J. Joseph, C. Chaminade, and J. Vang, 1–32. Cheltenham: Edward Elgar Publishing.
- Maldonado-Mariscal, K. 2023. “Grassroots Innovation and Social Innovation in Perspective.” *Frontiers in Sociology* 8: 1–11. doi:10.3389/fsoc.2023.1247293.
- Masanja, V. G. 2010. “Increasing Women’s Participation in Science, Mathematics and Technology Education and Employment in Africa.” In *United Nations Division for the Advancement of Women: Expert Group Meeting: Gender, Science and Technology*, edited by B. Huye. Rwanda: National University of Rwanda & University of Dar es Salaam. [https://www.un.org/womenwatch/daw/egm/gst\\_2010/Masanja-EP8-EGM-ST.pdf](https://www.un.org/womenwatch/daw/egm/gst_2010/Masanja-EP8-EGM-ST.pdf).
- Merkel, J. 2019. “‘Freelance Isn’t Free.’ Co-Working as a Critical Urban Practice to Cope with Informality in Creative Labour Markets.” *Urban Studies* 56 (3): 526–547. doi:10.1177/0042098018782374.
- MoEST (Ministry of Education, Science and Technology of Tanzania). 2022. Draft National Innovation Framework. Accessed June 16, 2023. Available at: <https://www.moe.go.tz/en>.
- Muchie, M., P. Gammeltoft, and B. Lundvall. 2003. *Putting Africa First: The Making of African Innovation Systems*. Aalborg: Aalborg University Press.
- Mwantomwa, K., N. Ndege, J. Atela, and A. Hall. 2021. “Scaling Innovation Hubs: Impact on Knowledge, Innovation and Entrepreneurial Ecosystems in Tanzania.” *Journal of Innovation Management* 9 (2): 39–63. doi:10.24840/2183-0606\_009.002\_0005.
- NBS (National Bureau of Statistics). 2018. *National Population Projections*. Dar Es Salaam: The Government of Republic of Tanzania.
- NEEC (Tanzania National Economic Empowerment Council). 2017. “Inclusive National Entrepreneurship Strategy.” Dar es Salaam: NEEC. Accessed June 16, 2023. <https://www.uwezeshaji.go.tz/>.
- Nkwabi, J., and L. Mboya. 2019. “A Review of Factors Affecting the Growth of Small and Medium Enterprises (SMEs) in Tanzania.” *European Journal of Business and Management* 11 (33): 1–8. doi:10.7176/EJBM/11-33-01.
- OECD (Organisation for Economic Co-operation and Development). 2012. “Innovation for Development.” Accessed May 15, 2023. Available at: <https://www.oecd.org/>.
- Parrino, L. 2015. “Coworking: Assessing the Role of Proximity in Knowledge Exchange.” *Knowledge Management Research & Practice* 13 (3): 261–271. doi:10.1057/kmrp.2013.47.
- Pansera, M., and R. Owen. 2018. “Framing Inclusive Innovation within the Discourse of Development: Insights from Case Studies in India.” *Research Policy* 47 (1): 23–34. doi:10.1016/j.respol.2017.09.007.
- Papaioannou, T. 2014. “How Inclusive can Innovation and Development Be in the Twenty-First Century?” *Innovation and Development* 4 (2): 187–202. doi:10.1080/2157930X.2014.921355.
- Papaioannou, T. 2018. *Inclusive Innovation for Development: Meeting the Demands of Justice Through Public Action*. London: Routledge.
- Parker, M., J. Wills, and G. Wills. 2013. “RLabs: A South African Perspective on a Community-Driven Approach to Community Information.” *Journal of Community Informatics* 9 (3): 1–14. doi:10.15353/joci.v9i3.3160
- Patnaik, J., and B. Bhowmick. 2020. “Promise of Inclusive Innovation: A Re-Look Into the Opportunities at the Grassroots.” *Journal of Cleaner Production* 259:121124. doi:10.1016/j.jclepro.2020.121124.
- Paunov, C. 2013. “Innovation and Inclusive Development: A Discussion of the Main Policy Issues.” *OECD Science Technology and Industry Working Papers* 1. doi:10.1787/5k4dd1rvsnjj-en.
- Pavitt, K. 2022. “Innovating Routines in the Business Firm: What Corporate Tasks Should They Be Accomplishing?”

- Industrial and Corporate Change* 11 (1): 117–133. doi:10.1093/icc/11.1.117.
- Planes-Satorra, S., and C. Paunov. 2017. “Inclusive Innovation Policies: Lessons from International Case Studies.” *OECD Science, Technology and Industry Working Papers* 2. doi:10.1787/a09a3a5d-en.
- Ramani, S. V., S. Athreye, M. Bruder, and A. Sengupta. 2023. “Inclusive Innovation for the BoP: It’s a Matter of Survival!” *Technological Forecasting and Social Change* 194: 1–18. doi:10.1016/j.techfore.2023.122666.
- RLabs. 2023. Available at: Accessed March 17, 2023. <https://rlabs.org/>.
- Salas, B. K., and R. Avento. 2023. “The Ethical Guidelines for Responsible Academic Partnerships with the Global South.” Finnish University Partnership for International Development, UniPID. Accessed June 4, 2024. <http://hdl.handle.net/10138/566406>.
- Schillo, R. Sandra, and Ryan M. Robinson. 2017. “Inclusive Innovation in Developed Countries: The Who, What, Why, and How.” *Technology Innovation Management Review* 7 (7): 34–46. doi:10.22215/timreview/1089.
- Schot, J., and W. E. Steinmueller. 2018. “Three Frames for Innovation Policy: R&D, Systems of Innovation and Transformative Change.” *Research Policy* 47 (9): 1554–1567. doi:10.1016/j.respol.2018.08.011.
- Schumpeter, J. A. 1934. *The Theory of Economic Development: An Inquiry Into Profits, Capital, Credit, Interest, and the Business Cycle*. Cambridge: Harvard University.
- Shearmur, R., C. Carrincazeaux, and D. Doloreux. 2016. *Handbook on the Geographies of Innovation*. Cheltenham: Edward Elgar Publishing.
- Singh, A. K., and R. Roy Burman. 2019. “Agricultural Extension Reforms and Institutional Innovations for Inclusive Outreach in India.” In *Agricultural Extension Reforms in South Asia*, edited by S.C. Babu, and P.K. Joshi, 289–315. Cambridge: Academic Press. doi:10.1016/B978-0-12-818752-4.00016-3.
- Tanzania National Bureau of Statistics. 2018. “Population Projections for the Period of 2013 to 2025 at National Level.” Accessed March 17, 2023. <https://www.nbs.go.tz/>.
- Tartaruga, I., F. Sperotto, and L. Carvalho. 2024. “Addressing Inclusion, Innovation, and Sustainability Challenges through the Lens of Economic Geography: Introducing the Hierarchical Regional Innovation System.” *Geography and Sustainability* 5 (1): 1–12. doi:10.1016/j.geosus.2023.10.002.
- TSA (Tanzania Startup Association). 2023. “Tanzania Startup Ecosystem Status Report 2023.” Available at: [https://tsa.co.tz/publication\\_list](https://tsa.co.tz/publication_list) (accessed 15 May 2023)
- United Nations. 2015. *The 2030 Agenda for Sustainable Development*. New York: United Nations.
- UNDP (United Nations Development Programme). 2020. *Strategies for Supporting Inclusive Innovation*. New York: UNDP. Available at: <https://www.undp.org/publications/strategies-supporting-inclusive-innovation> (accessed 27 May 2024).
- UNDP (United Nations Development Programme). 2021. *Human Development Index*. New York: UNDP. Available at: <https://hdr.undp.org> (accessed 15 May 2023).
- UNFPA (United Nations Population Fund) 2023. Available at: <https://www.unfpa.org/data/world-population/TZ> (accessed 15 May 2023).
- UNICEF (United Nations Children Fund). 2023. Available at: <https://www.unicef.org/> (accessed 10 May 2023).
- van der Merwe, E., and S. S. Grobbelaar. 2018. “Systemic Policy Instruments for Inclusive Innovation Systems: Case Study of a Maternal MHealth Project in South Africa.” *African Journal of Science, Technology, Innovation and Development* 10 (6): 665–682. doi:10.1080/20421338.2018.1491678.
- Vidaillet, B., and Y. Bousalham. 2020. “Coworking Spaces as Places Where Economic Diversity Can be Articulated: Towards a Theory of Syntopia.” *Organization* 27 (1): 60–87. doi:10.1177/1350508418794003.
- Von Hippel, E., and R. Katz. 2002. “Shifting Innovation to Users via Toolkits.” *Management Science* 48 (7): 821–833. doi:10.1287/mnsc.48.7.821.2817.
- Von Hippel, E. 2006. *Democratizing Innovation*. Cambridge, MA: The MIT Press.
- Weber, K. Matthias, and Harald Rohrer. 2012. “Legitimizing Research, Technology and Innovation Policies for Transformative Change: Combining Insights from Innovation Systems and Multi-Level Perspective in a Comprehensive ‘Failures’ Framework.” *Research Policy* 41 (6): 1037–1047. doi:10.1016/j.respol.2011.10.015.
- Wills, J., M. Parker, and G. Wills. 2015. “Reflective Evaluation of Civil Society Development: A Case Study of RLabs Cape Town, South Africa.” *The Journal of Community Informatics* 11 (3): 1–23. doi:10.15353/joci.v11i3.2764
- WIPO (World Intellectual Property Organization). 2022. *Regional and Global Innovation Index*. Available at: [https://www.wipo.int/global\\_innovation\\_index/en/](https://www.wipo.int/global_innovation_index/en/) (accessed 19 June 2023).
- Woodson, T. S., and L. D. Williams. 2020. “Stronger Together: Inclusive Innovation and Undone Science Frameworks in the Global South.” *Third World Quarterly* 41 (11): 1957–1972. doi:10.1080/01436597.2019.1702458.
- World Bank. 2018. “Gini Index –Tanzania.” Washington DC: World Bank. Available at: <https://data.worldbank.org/indicator/SI.POV.GINI> (accessed 20 May 2023).
- World Bank. 2023. “World Development Indicators Database.” Washington DC: World Bank. Available at: <https://data.worldbank.org/indicator/> (accessed 28 May 2023).