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The Role of AI Innovation Clusters in Fostering Youth Employment in Africa

Opportunities, Challenges, and Implications

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Authors

Wadzi Comfort and Abbie Phatty-Jobe.

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Executive summary

Artificial intelligence (AI) is reshaping the global employment landscape, presenting both opportunities and challenges for Africa's large youth population. In 2020, 60% of Africa's population was under the age of 25. This demographic dividend represents a significant opportunity for economic development. However, persistent youth unemployment and skills mismatches pose substantial barriers.

AI innovation clusters in countries like South Africa, Egypt, Nigeria, and Kenya are promising catalysts for job creation that could overcome these barriers. Innovation clusters—geographic concentrations of interconnected businesses, suppliers, and institutions in specific fields—are fundamental drivers of economic growth.

This report assesses the current state of and key challenges facing the region's emerging AI innovation clusters, identifying the unique conditions and linkages necessary to support AI innovation, with specific attention to youth employment.

Leveraging insights from expert interviews, secondary data analysis, and a comprehensive literature review, the report provides evidence-based recommendations for strengthening these clusters to advance job creation and economic growth.

Innovation clusters are complex ecosystems comprising various stakeholders, including academia, human capital, policymakers, Big Tech, and investors. **This study identifies grassroots AI communities as a unique part of African AI innovation clusters**, one that plays a crucial role in shaping the AI landscape and its potential for youth employment.

Informal, grassroots AI communities are serving as strong nuclei of AI innovation clusters in Africa. These formal and informal networks contribute significantly to skills development, research collaboration, job placement, and advocacy. Communities like Zindi, Data Science Nigeria, and Deep Learning Indaba play crucial roles shaping the AI landscape, but often struggle with limited resources and sustainability challenges. Grassroots AI impacts all other components of AI innovation clusters, demonstrating its potential for strengthening and supporting these clusters.

African academia is increasingly recognizing the importance of AI. Institutions like the African Institute for Mathematical Sciences and Carnegie Mellon University Africa offer specialized AI programs. However, the shortage of qualified professors and limited infrastructure hamper the development of a robust AI talent pipeline. Universities should strengthen their AI curricula, foster industry partnerships, and enhance research commercialization mechanisms to bridge the gap between academia and industry.

Human capital is a critical factor in the success of AI innovation clusters. Africa's young, tech-savvy population demonstrates enthusiasm and creativity in engaging with AI technologies. However, a significant skills gap persists. Many graduates lack the practical, up-to-date skills required by the AI industry. Grassroots initiatives have emerged to address this by providing upskilling, knowledge sharing, and job placement. These communities play a vital role in fostering the growth of the AI ecosystem but face challenges in sustainability and reach due to limited resources.

The **policy environment** significantly influences the trajectory of AI innovation clusters. While only five African countries have adopted comprehensive national AI strategies, governments are increasingly playing a catalytic role in convening stakeholders and providing strategic direction for AI development. However, a lack of deep understanding of AI among policymakers often leads to policies that are either too restrictive or too lax. Experts advocate for a policy environment that prioritizes innovation while addressing potential risks and ethical concerns. Big Tech companies like Google, IBM, Meta, and Microsoft have established a significant presence in Africa's AI landscape. Their investments in infrastructure, research labs, and training programs provide valuable resources and opportunities. However, concerns about monopolization, data exploitation, and alignment with national priorities persist. Experts call for a more collaborative and equitable approach that empowers local AI ecosystems and ensures that the benefits of AI are shared broadly.

Investors and donor agencies play a crucial role in shaping AI innovation clusters through their funding priorities. Venture capital investment in African DeepTech startups, including AI ventures, reached $1.2 billion in 2023. Philanthropic organizations like the Mastercard Foundation and the International Development Research Centre also contribute substantially to advancing AI in Africa. However, the concentration of funding in specific sectors, particularly health and agriculture, raises concerns about the diversification of AI applications across other critical areas.

Infrastructure remains a fundamental challenge for AI development in Africa. Limited access to reliable electricity, affordable internet connectivity, and sufficient computing capacity hinders the growth of AI innovation clusters. Data availability and accessibility also present significant hurdles. Experts emphasize the need for increased investment in AI-related infrastructure, encompassing both public and private sectors.

At the heart of these clusters, **African AI startups** are driving innovation and addressing local needs, creating employment opportunities and strengthening the AI talent pipeline. However, they face significant challenges in accessing finance, finding qualified talent, and achieving sustainability. Many startups rely on existing AI tools and APIs rather than building their own solutions, potentially limiting the development of unique, locally tailored innovations.

Recommendations to strengthen AI innovation clusters in Africa

- **Seed innovation clusters.** Strengthen AI innovation clusters through targeted investment. Successful examples include IDRC AI4D's donor-led model, Tanzania AI Community's grassroots approach, Kenya's Microsoft partnership, and Makerere University AI Health Lab's focused healthcare model. Key success factors include influential sponsors, a strong nucleus (often an academic institution), access to infrastructure, and skilled human capital.
- **Foster a collaborative ecosystem.** Strategic orchestration is crucial for economic growth. Governments must act as catalysts and coordinators. Innovation hubs, shared services, and university–industry collaboration are essential. Leverage existing grassroots AI initiatives and organizations like Zindi to expand the base of human capital.
- **Invest in foundational building blocks.** Prioritize developing data centers and computing infrastructure, taking a regional approach. Basic digital infrastructure—reliable electricity and internet—remains critical for widespread AI adoption.
- **Prioritize talent development.** Create targeted upskilling programs aligned with industry needs, training-of-trainers initiatives, and foundational programs leading to job placement. Traditional university scholarships alone are insufficient.

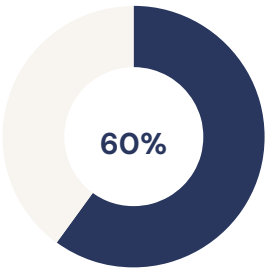
- **Facilitate research and policy development.** Investment in contextualized AI research for Africa is crucial, alongside supportive policies that balance innovation with ethical considerations.
- **Focus on African-led solutions.** Data bias in existing foundational models must be addressed by incorporating African data. Development should prioritize locally relevant applications that solve unique African challenges, reducing dependence on imported technologies.

By implementing these recommendations, African countries can create a robust environment for AI innovation clusters to thrive, fostering youth employment and driving economic growth. The success of these efforts will depend on coordinated action from governments, educational institutions, private sector actors, and civil society. With strategic investments and supportive policies, Africa can position itself at the forefront of the global AI revolution and unlock the full potential of AI to create a prosperous and technologically advanced future for its youth.

Introduction

Africa stands at a critical juncture in its development, with its large youth population (60% under 25 as of 2020) representing both an opportunity and challenge. While this demographic segment could drive substantial economic growth, persistent youth unemployment and skills mismatches in the labor market pose significant barriers.

Deliberation surrounding youth unemployment dominates contemporary discussions across multiple geographic domains. This narrative manifests with particular urgency in African policy conversations, where demographic transitions—specifically the "youth bulge"—and a rapidly changing economy make employment challenges both salient and urgent.



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In 2020 60% of Africa's population was under 25.

Alongside these demographic pressures, the emergence of artificial intelligence (AI) presents both opportunities and challenges in the employment landscape, both in Africa and globally. Although the full trajectory of AI development is still uncertain, its transformative impact on labor markets is inevitable, potentially creating new opportunities in some sectors while disrupting traditional employment patterns in others.

This report presents an opportunity to merge these parallel narratives by considering how AI can play a role in enhancing livelihood prospects and shaping the future of Africa's workforce. Specifically, it investigates **how locally developed innovations and enterprises, when properly cultivated within the African context, might contribute to addressing youth employment challenges.**

This analysis employs the conceptual framework of innovation clusters, focusing on the fertile environment necessary for enterprise development and AI integration. Rather than viewing firms as isolated entities, the analysis conceptualizes them as embedded within interconnected clusters—rich ecosystems of interaction and innovation. This cluster-based perspective provides the theoretical foundation for the study.

The central research question guiding this investigation is:

> How can AI innovation clusters be cultivated in Africa to generate expanded employment opportunities for the continent's youth population?

While this inquiry is inherently complex and multifaceted, the methodological approach—incorporating both youth perspectives and industry expert insights—aims to identify actionable pathways for multiple stakeholders, including philanthropic foundations, private sector entities, and regulatory bodies.

Context for the study

This study integrates two distinct theoretical lenses to develop a single analytical model for understanding AI innovation ecosystems in the African context: the industry cluster paradigm and AI as an innovative force.

The first is the idea of the industry cluster,[1] a well-established paradigm in economic geography and industrial organization that has evolved over the past five decades. Industrial cluster theory, which has demonstrated its analytical usefulness across a range of sectors from car parts to tourism, posits that firm performance and innovation capabilities are fundamentally linked to and embedded within their broader socioeconomic environment.[2] This theoretical perspective challenges the notion of innovation within a vacuum, instead emphasizing the crucial role of ecosystem dynamics in determining both the success of firms and the applicability of their innovations.[3]

The second lens encompasses the distinctive characteristics of AI and AI-driven innovations as technological phenomena. While AI shares some similarities with previous digital innovations—including the presence of large incumbent firms alongside emerging startups, the central role of research and development, venture capital funding mechanisms, and traditional innovation diffusion patterns—it also presents unique structural considerations.

1 Porter, "Clusters and the New Economics of Competition."
2 Zhao, Liang, and Tu, "How Do Clusters Drive Firm Performance in the Regional Innovation System?"
3 Bittencourt et al., "Cluster Innovation Capability: A Systematic Review."

These AI-specific factors include:

- Heavy reliance on foundational large language models designed and hosted by Western entities
- The prohibitive cost of computing and digital connectivity
- Infrastructure dependencies related to cloud computing and supercomputers to train models
- Distinct ethical considerations surrounding bias, privacy, security, and safety

The synthesis of these two lenses enables a nuanced analysis of the prerequisites for fostering AI innovation ecosystems—that is, firm creation and innovation within the AI sector. While certain elements of this analysis have applicability across global innovation hubs—whether in São Paulo, Bucharest, or Edinburgh—other factors are unique to the African context. Transitioning from theoretical foundations to practical applications, the analysis evaluates African AI innovation clusters through two lenses: the contemporary configuration of enabling conditions and inputs, and the distinctive imperative of broad-based employment creation that characterizes the continent.

Innovation clusters and economic development

Innovation clusters—geographic concentrations of interconnected businesses, suppliers, and institutions in specific fields—are fundamental drivers of economic growth.[4] These networks facilitate knowledge sharing, support collaboration, and attract investment through enhanced access to shared infrastructure, specialized labor pools, and local supply chains. Michael Porter's seminal cluster theory emphasizes how geographic proximity enables knowledge spillovers and continuous innovation while allowing businesses to achieve economies of scale through resource pooling.[5]

The impact of innovation clusters extends beyond economic growth. They foster job creation in high-tech sectors, attracting and retaining skilled professionals, while also promoting an innovation culture that enables businesses to rapidly adapt to market changes and technological advancements.[6]

4 IDIA, "What Is an Innovation Ecosystem?"; Porter, "Clusters and the New Economics of Competition."
5 IDIA, "What Is an Innovation Ecosystem?"
6 Delgado, Porter, and Stern, "Clusters, Convergence, and Economic Performance."

The success of innovation clusters depends on strong collaborative partnerships among industry, academia, and government agencies, accelerating innovation through shared resources and joint technology projects.[7] When well designed and coordinated, robust innovation clusters facilitate an influx of significant investment from venture capitalists, angel investors, and government grants, fueling the growth of startups and innovative businesses.[8]

An innovation cluster typically has a sponsor responsible for its genesis,[9] orchestrating the key actors, such as private sector companies, research institutions, and investors within the ecosystem. The initiators or architects of innovation clusters vary globally: government actors, private sector organizations, academia, and, in some instances, industry associations.[10] For example, Silicon Valley, the most well-known innovation cluster, emerged from Stanford University's School of Engineering against the backdrop of the emergence of the semiconductor industry.[11] China's innovation clusters are typically catalyzed by government strategic intent and funding to back up a predetermined strategy designed by the government agency sponsoring the cluster initiative.[12] In this case, the Chinese government plays a significant role in shaping the startup ecosystem through policies, regulations, and support programs.

For innovation clusters to thrive, they need support in the following areas:

1 **Policy and regulatory framework**
A robust policy framework is essential for guiding the development and deployment of emerging technologies, ensuring they align with democratic values and societal benefits while mitigating any anticipated risks.

2 **Physical infrastructure**
The anticipated adoption of advanced technologies elicits an increasing need for more robust and extensive digital infrastructure. Emerging contemporary technologies require substantial data resources and computing power to function effectively, putting more and more demands on underlying digital infrastructure, including hardware, software, network connectivity, and data centers.

3 **Investment capital**
Innovation clusters of global renown, such as Silicon Valley, flourish in the presence of capital investment from the private sector and/or government, as is the case with China's innovation clusters, which are predominantly funded by public investment. Venture capital, philanthropic capital, and government funding are vital for supporting startups and enabling the commercialization of new technologies. Investment is vital for driving innovation and scaling new solutions.

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7 Engel, *Global Clusters of Innovation Entrepreneurial Engines of Economic Growth around the World*.
8 Katz and Wagner, "The Rise of Innovation Districts: A New Geography of Innovation in America."
9 Delgado, Porter, and Stern, "Clusters, Convergence, and Economic Performance."
10 Baldwin et al., "Focusing the Ecosystem Lens on Innovation Studies."
11 National Research Council, *Best Practices in State and Regional Innovation Initiatives*.
12 Dai et al., "Innovation Network Formation and the Catalyzing State."

4 **Research and academia**
Academic and research institutions play a pivotal role in advancing research and innovation, contributing to the ecosystem through cutting-edge studies and the development of new technologies. Not only do they contribute by way of research and development, they also contribute a pipeline of relevant skills to staff corporations and startups within the cluster.

5 **Human capital**
Access to a highly skilled workforce, including scientists, engineers, and domain experts, is essential for driving innovation.[13] A diverse talent pool, including both technical and non-technical roles, is crucial for harnessing the full potential of new technologies and allows for a broader application of innovations across various functions.

6 **Big Tech**
Big Tech has played a key role in accelerating the proliferation of innovation clusters across the globe.[14] In the African context, large technology multinational corporations are playing a notable role in the innovation ecosystem and are worth highlighting as a distinct key actor.

AI and the future of work in Africa

The emergence of AI differs from other recent digital technology advancements by virtue of its unprecedented speed and scale of impact, in addition to its transformative economic impact on a global level. The impact of AI and other big data technologies on the global economy has been deemed to be as transformative as the Industrial Revolution.[15] The technology, still in its nascent stages, is developing so rapidly that its impacts are difficult to predict.

In the African context, AI is already translating to significant employment opportunities in sectors such as healthcare, agriculture, and financial services. However, pessimistic views warn of potential job displacement, especially in sectors vulnerable to automation. A study by the ILO cautions that "*up to two-thirds of all jobs in developing countries are susceptible to automation*."[16] This raises concerns about the future of work for African youth, particularly those in low-skilled occupations.

If Africa is to harness the advantages of AI advancements, its AI innovation clusters must be a driver of broad-based employment.

13 Fallah, "Technology Clusters and Innovation."
14 National Research Council, "Overview: The New Federal Role in Innovation Clusters."
15 Abis and Veldkamp, "Changing Economics of Knowledge Production."
16 Global Commission on the Future of Work, "Work for a Brighter Future."

Methodology

This research employs a mixed methods approach, combining qualitative and quantitative data collection techniques to provide a comprehensive understanding of AI innovation clusters and their impact on youth employment in Africa.

Three specific methods were used:

1. **Expert interviews**: In-depth interviews were conducted with twenty-five African AI professionals, policymakers, educators, and industry leaders. These interviews provided insights into the current state of AI innovation clusters, challenges faced, and potential solutions to those challenges. Experts were sourced from the author's professional network and LinkedIn. In addition, the snowball method was employed: leveraging interviewed professionals to nominate additional AI experts in their network who play a role in academia, the social sector, the private sector, or government policymaking.[17]
2. **Interviews with young professionals**: In-depth interviews were undertaken with eighteen members (ages 18 to 35) involved in AI-related fields or seeking employment in the tech sector. Respondents were drawn from a representative sample of community members of Zindi, Africa's largest data science community. Respondents provided insight into their skills, job prospects, challenges, and perceptions of AI's impact on employment.
3. **Secondary data analysis**: A review of reports, academic literature, and policy documents related to AI, innovation clusters, and youth employment in Africa was also conducted.

17 Goodman, "Snowball Sampling."

Research findings and analysis

AI innovation clusters in Africa comprise several essential components that collectively drive youth employment and technological advancement: grassroots AI communities, African academia, human capital and AI professionals, policy and policymakers, Big Tech, investors and donors, infrastructure, and African AI startups.

The following analysis explores these interconnected elements in the African context, incorporating additional unique insights gained through interviews. A distinctive finding emphasizes the foundational role of grassroots AI communities in strengthening and connecting all other components of Africa's thriving innovation clusters.

Grassroots AI communities: Shaping innovation and human capital

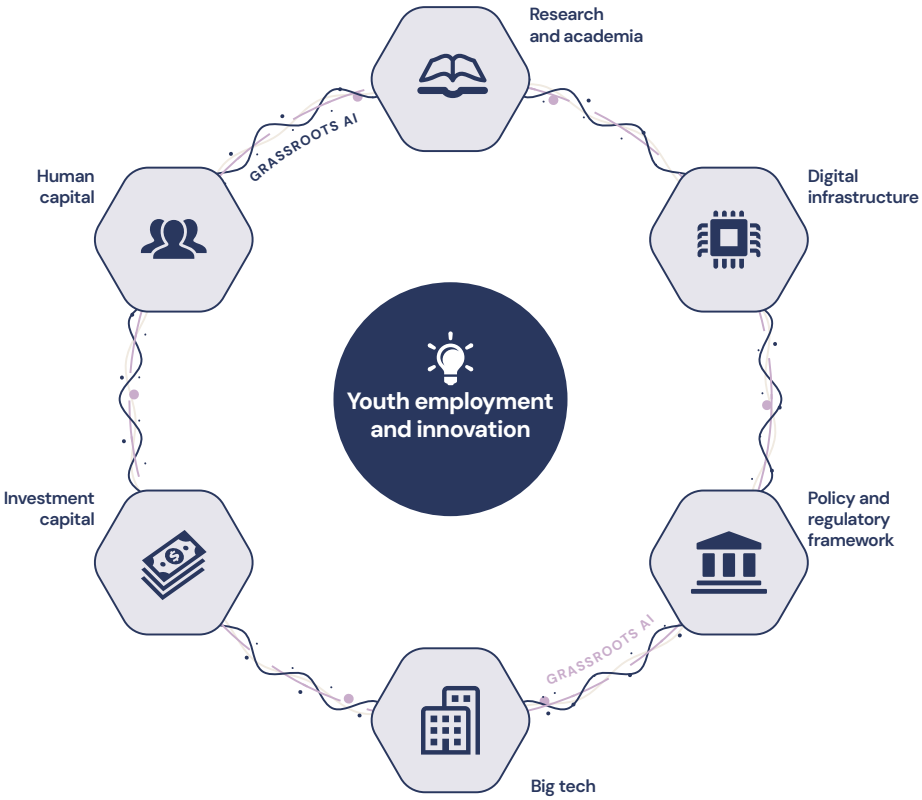
The initial analytical framework highlighted six key sets of actors that contribute to the success of AI clusters: government, private companies (including startups), research and academia, Big Tech, investors and funders, and human capital. During interviews with experts and young African AI professionals, an entirely unexpected dimension emerged: grassroots AI.

In a testament to the agency and resilience of young people across the continent, grassroots initiatives are organizing to address the skills gap. Aggregated under the umbrella of "grassroots AI," formal and informal communities of data scientists and AI professionals are playing a vital role in fostering the growth of the AI ecosystem. Grassroots AI encompasses formal communities like Data Science Africa, Deep Learning Indaba, Data Science Nigeria, and various informal groups that collaborate on WhatsApp and in person.

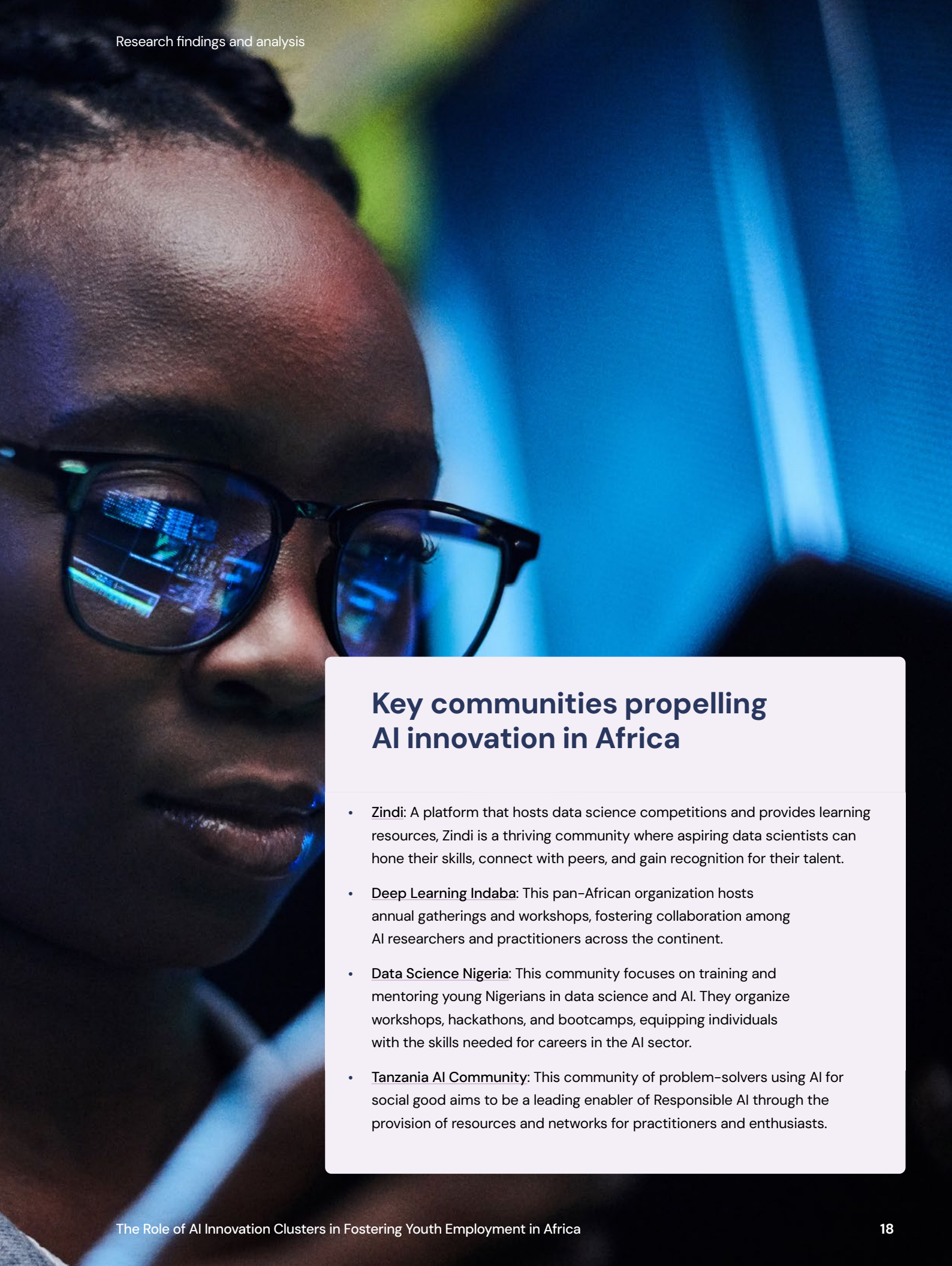
> *"The best part about it is that I have a couple of communities and networks that I'm part of. So I get to learn. I do so much in prompt engineering now. I learn what people are doing and [figure out] how to even equip my community with it. So you see one thing about [this], you learn and then you give back, so, learn and teach at the same time. Because the minute I teach you something that I've learned then I learned twice.'*
>
> **Ruth Nduta, Zindi community member**

Grassroots initiatives and technology communities emerged as a surprising and incredibly strong nucleus of AI innovation clusters in Africa, fostering skills development, championing African AI research on global platforms, catalyzing job creation and new venture creation, and harnessing foreign direct investment into programs to strengthen AI innovation ecosystems. They function as key orchestrators, initiating the coordinated collaboration of actors to develop a cluster around AI innovation. In some cases, grassroots initiatives also harness investment capital to foster strategic inventions that convene diverse actors and drive policymaking agendas.

In the schematic framework of an AI innovation cluster, grassroots AI is the dynamic line that connects all the actors of the cluster wheel.



Respondents frequently mentioned the crucial role of informal AI communities in propelling AI innovation in Africa. They emphasized how these communities, often born out of necessity due to limitations in formal education and industry, are making contributions in developing human capital, fostering job creation, and encouraging collaboration within the AI sector.



Key communities propelling AI innovation in Africa

- Zindi: A platform that hosts data science competitions and provides learning resources, Zindi is a thriving community where aspiring data scientists can hone their skills, connect with peers, and gain recognition for their talent.
- Deep Learning Indaba: This pan-African organization hosts annual gatherings and workshops, fostering collaboration among AI researchers and practitioners across the continent.
- Data Science Nigeria: This community focuses on training and mentoring young Nigerians in data science and AI. They organize workshops, hackathons, and bootcamps, equipping individuals with the skills needed for careers in the AI sector.
- Tanzania AI Community: This community of problem-solvers using AI for social good aims to be a leading enabler of Responsible AI through the provision of resources and networks for practitioners and enthusiasts.

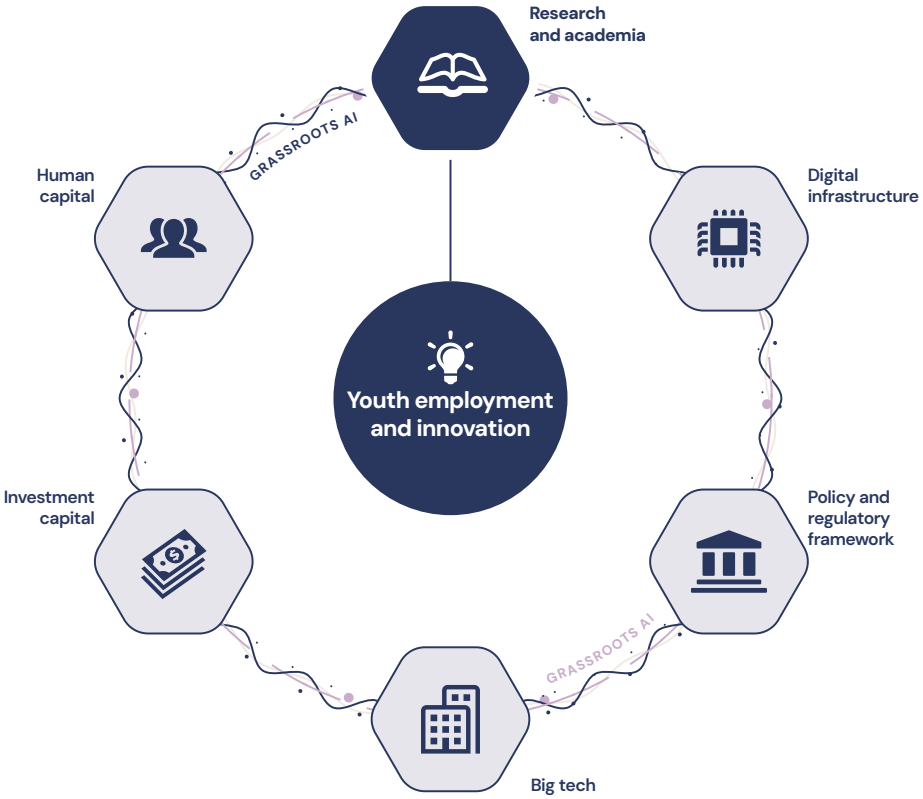
Other key contributions of formal and informal grassroots and networks are bolstering AI innovation ecosystems in various ways.

- **Skills development and mentorship:** Respondents consistently portray informal AI communities as vibrant learning hubs where individuals, often young people, can access training and mentorship opportunities that are absent from formal settings. These communities provide a platform for knowledge sharing, skill development, and practical application of AI concepts, bridging the skills gap and fostering a culture of continuous learning. They offer a valuable alternative to traditional educational pathways, providing hands-on experience, peer-to-peer learning, and exposure to real-world AI projects.
- **Job placement and networking:** Informal AI communities serve as crucial networking hubs, connecting individuals with potential employers and job opportunities. The strong connections within these communities allow members to share information about job openings, internships, and freelance projects, increasing access to employment opportunities within the AI sector.
- **Research collaboration and shared resources:** Formal AI-focused communities facilitate collaboration among AI enthusiasts, researchers, and entrepreneurs, leading to the development of collaborative projects, open-source tools, and shared resources. This collaborative spirit fosters a collective approach to problem-solving, leveraging the diverse skills and perspectives within the community.
- **Broadcasting African research for global audiences and impact:** Deep Learning Indaba hosts an annual conference that is consistently oversubscribed and is noted as an R&D platform that donors and investors fund to source impactful AI-driven initiatives.
- **Advocacy and policy influence:** In some instances, these communities are also influencing policy development and advocating for greater support for AI development in their respective countries. By engaging with policymakers and raising awareness about the importance of AI, these groups are shaping the future of the AI landscape in Africa.

Informal AI communities are demonstrably playing a vital role in shaping AI innovation clusters in Africa, contributing significantly to human capital development, fostering job creation, and encouraging collaborative approaches to AI development. They are, however, hampered by limited access to financial resources and rely heavily on volunteerism and community support, which curtails their sustainability and reach. By recognizing the contributions of these communities, addressing their challenges, and supporting their growth, stakeholders can contribute to the development of a more inclusive, vibrant, and sustainable AI ecosystem in Africa.

African academia: Driving AI innovation and talent development

African universities and research institutions are playing an increasingly vital role in advancing AI capabilities across the continent. Despite facing the challenges associated with maintaining pace with a seismic and rapidly evolving AI revolution, these institutions are making significant strides in developing local talent and fostering innovation. Several African institutions have introduced specialized AI courses and degrees to equip students with relevant knowledge and skills.



This list—by no means exhaustive—indicates the geographic diversity of AI-oriented offerings propelling that advancement of AI talent development across the continent.

- The African Institute for Mathematical Sciences has multiple hubs throughout Africa, including Ghana, South Africa, and Kenya. They offer master's and doctoral programs focused on AI.
- Carnegie Mellon University Africa is investing heavily in AI capability and skills development.
- The University of Lagos is investing in developing formal communities and building AI capacity in their academic ecosystems.

- Makerere University in Uganda stands out with their AI research lab. They offer courses that teach AI skills as part of their computer science coursework at the undergraduate level.
- Institut National Polytechnique Félix Houphouët-Boigny in Côte d'Ivoire offers a master's in data science, big data, and AI.

The gains made in increasing the pipeline of AI talent in Africa are taking place despite a number of challenges related to the AI education sector in Africa in order to fully develop the continent's AI talent pool. There is a shortage of professors qualified to teach specialized AI courses in many African countries with a few exceptions.

"There's just not enough professors to help teach these courses and also provide students with specialized instruction … This is where universities are not necessarily able to provide or fill in that gap. I should point out that the [African Institute for Mathematical Sciences], for example, has been very helpful in being able to help students bridge the skills gap from basic AI or mathematical sciences to actually providing more specialized instruction, like data science [and] machine learning. But there was a ranking of AI institutions that I saw recently. I don't think any African countries were near the top, which is honestly expected, but I think that's something that will have to happen in the future to make sure African students are more competitive and prepared for the local and international job markets."

Dr. Chinasa Okolo, Fellow, Brookings Institution

Expert interviewees highlighted the need for more practical training opportunities to prepare students for real-world AI jobs and equip them with hands-on experience to complement their theoretical knowledge. The growing trend of collaboration between African universities and universities abroad, including joint degree programs, also contributes to reducing this skills gap.

"We're looking at developing programs that are practical, moving away from just theory capacity building. I would really advocate for this because we need more practical skills within these students than just theory."

Dr. Deji Ajani, Chief Digital Officer, Leads Innovation Limited

"I've been seeing a rising number of joint degree programs, especially master's programs, between African universities and European universities. So I think this could also help fill the gap. But I think that it will be important for African institutions to figure out ways to upskill their professors."

Dr. Chinasa Okolo, Fellow, Brookings Institution

Research and development: Nurturing centers of excellence

African universities and research institutions are undertaking crucial research in AI. They serve as knowledge hubs and research incubators, allowing researchers to develop ideas and test proof-of-concept before commercialization. Institutional support can help researchers secure funding and validate their concepts, increasing the likelihood of successful AI-driven ventures. For example, in Uganda, Makerere University has distinguished itself as a vibrant research incubator, developing innovative AI solutions tailored to African challenges. Its AI Health Lab and AI & Data Science Research Lab have spun out startups that are active in Uganda's AI ecosystem.

While African research institutions are undertaking a significant amount of research, there is a notable lack of representation of African voices and research output, especially at premier conferences.

"This is really an issue because conferences are ways that people can actually interact with each other, learn, and share different ideas. When you have Chinese and American researchers dominating these spaces, it tells you that their values are also prioritized in this kind of research."

Dr. Chinasa Okolo, Fellow, Brookings Institution

By encouraging and supporting African researchers to publish on international platforms, increasing their visibility and influence, the global AI community can benefit from diverse perspectives, leading to more inclusive and equitable development of AI technologies.

Catalyzing and orchestrating collaborative ecosystems

A key strength of African academia and research institutions is their ability to foster collaboration among diverse stakeholders. These institutions leverage the gravitas of their research and academic contributions and other assets, physical and otherwise, to convene key actors around a shared goal or topic of interest. Several expert interviewees provided examples of notable academic partnerships that are fostering collaboration with the private sector, government, donor agencies, and academic institutions in other regions. They have all been involved in government task forces and working groups on national AI strategies in their respective home countries. Academicians have been able to influence AI development, ensuring it aligns with local needs and is data-driven.

Several donor-funded AI cluster development initiatives are anchored by academics in intuitions across the continent. For example, the IDRC and UK Foreign, Commonwealth and Development Office (FCDO) have established an AI cluster-building initiative in Senegal under the auspices of their AI for Development (AI4D) program. AI4D supports the AI Living Lab for Innovative and Viable Ethical Policies and Systems (ALIVE Lab) anchored at Université numérique Cheikh Hamidou Kane and led by Professor Seydina Moussa Ndiaye, an AI and computer science researcher with twenty years of experience.

Human capital and AI professionals: The heart of African AI clusters

Building thriving AI innovation ecosystems hinges on a diverse talent pool capable of developing, implementing, and maintaining AI technologies. Skilled professionals are indispensable in creating advanced AI algorithms, which requires expertise in machine learning, data science, and software engineering to devise cutting-edge solutions. Furthermore, highly skilled individuals drive research and development efforts, pushing the boundaries of AI capabilities and fostering a culture of innovation and technological advancement within these ecosystems.[18]

18 World Economic Forum, *The Future of Jobs Report 2023*.

Africa is home to a rapidly growing pool of tech talent. As of 2021, there were more than 700,000 software developers on the continent, with significant concentrations in Nigeria, Egypt, and South Africa.[19] This number is expected to continue rising as more youth enter the tech industry. The youth population in Africa is set to double by 2030, making up 42% of the world's youth population—a significant opportunity for expanding the continent's tech talent pool.[20]

Africa's young and growing population as its competitive advantage

Human capital is the driving force behind the development of thriving AI clusters in Africa. The growing pool of young, tech-savvy Africans is a vital asset for AI cluster development. This demographic segment can be harnessed for the AI sector, especially given the continent's youthful energy and openness to technological advancements.

"Africa's youth bulge is a tremendous opportunity for AI innovation, given the right training and opportunities."

Athman Ali, Senior Advisor and Global Lead, Digital and Tech Transformation, Tony Blair Institute for Global Change

Respondents resoundingly described African youth as creative and eager to engage with AI. This creativity, coupled with a strong understanding of local contexts and challenges, can support the development of innovative AI solutions tailored to African needs. There is palpable excitement among young Africans about the possibilities AI offers as they are actively engaging with the digital world, displaying a willingness to learn and adapt to new technologies.

"People are very concerned about the jobs that will go away because of AI. But that's why the work that we're doing at Zindi is so important, because essentially what governments and other stakeholders have to consider is that on the backend jobs are also being created. So the key is to make sure that you're equipping people with the skills that are needed to capture those jobs that are now only a year old. What's incredible for Africa is that there's no such thing as someone with ten years of experience in generative AI or large language models. Anyone who has one year of experience at this point is competitive even globally. So I think there's a huge opportunity. Young people in Africa are digital natives, they're connected, they're educated."

Celina Lee, Founder and Chief Executive Officer, Zindi

19 Google and Accenture, "Africa Developer Ecosystem Report 2021."
20 Google and IFC, "e-Conomy Africa 2020."

This enthusiasm translates into a motivated workforce eager to acquire AI-related skills and contribute to the field's development. The dominant sentiment regarding the emergence of AI is positive: respondents value the opportunities AI presents and see that they outweigh the risks, which they acknowledged needed mitigating.

Shortage of adequately skilled talent

"There's a big gap in terms of getting qualified AI experts that are locally based or that are Nigerian based. It's a big, big challenge."

Dr. Deji Ajani, Leads Innovation Limited

Against the backdrop of enthusiasm and eagerness of youth to participate in AI-powered opportunities, local economies are hampered by the shortage of skilled professionals in AI and related fields, including data scientists, programmers, and AI researchers. This skills gap stems from limited access to quality education and training opportunities in these specialized areas.

Even when empowered by theoretical knowledge, the pool of human capital on the African continent is characterized by young professionals who have certificates but are not equipped to apply their knowledge in ways that solve problems in the workplace. Professor Ndiaye emphasized that the world of AI requires a combination of technical skill and interdisciplinary nimbleness that is not commonplace in academic settings to create effective solutions:

"We don't have enough companies doing AI so that in the process of acquiring these competencies, they could have a project to do to enhance their technical skills. AI is not only about theory, you have to also use other competencies. AI is not magic; it's a lot of work. And there is also a very important thing: a multidisciplinary approach. If you want to do AI applications for agriculture, or you have to deal with the health sector, you need to talk with people working in these fields to understand their problem and come to their way of designing a solution."

Dr. Seydina Moussa Ndiaye, Program Director at FORCE-N, Cheikh Hamidou Kane Digital University

The landscape for AI talent in Africa is complex. While there's an increasing pool of young, enthusiastic graduates, the job market faces challenges keeping pace with the AI industry's evolving demands, leading to a skills mismatch characterized by a lack of senior-level experience. Many young people lack the two to five years of work experience that companies desire.

"It sounds confusing … there's a lot of talent in the market, but companies are struggling to find talent. Both are true because the market or the talent pool is very young. … People with five to ten years of experience, they have no problem getting jobs; they're getting approached all the time."

Celina Lee, Founder and Chief Executive Officer, Zindi

Exploitation and lack of dignified work

Remuneration along the AI value chain is not always equitable. Young professionals raised concerns about the exploitation of data workers who do the tedious work of training AI models. Despite the rhetoric around AI creating new jobs, the reality for many young people is that many of these new jobs are lower skilled and outsourced to the Global South. This low-paying, precarious work typically does not contribute to worker well-being or career advancement, raising ethical concerns about the pursuit of profit for AI-powered companies at the expense of workers. The emergence of low-paid data annotation work leveraged to build foundational AI models presents a conundrum in environments characterized by high unemployment and low skills.[21]

"We talked about data workers and a lot of that setup is designed to exploit. Companies effectively take a look at high unemployment settings and find ways of maximizing their profit gains on the basis of income variance arbitrage between the Northern and Southern Hemisphere versus contributing to better quality jobs among the new AI jobs that are emerging."

Adio Dinika, AI Labor and Ethics Researcher, Distributed AI Institute of Research

On one hand, workers with secondary education and basic digital skills find themselves in a position to be employed; on the other hand, these jobs offer low wages and few opportunities for career advancement. This underscores the importance of ethical considerations and fair labor practices in the development and deployment of AI solutions.

Gender disparity in the AI workforce

While there are some opportunities for upskilling, access to quality training and resources remains a barrier for many young women, particularly in rural areas. All women interviewed highlighted the underrepresentation of women in the AI sector.

21 Williams, Miceli, and Gebru, "The Exploited Labor Behind Artificial Intelligence."

"I work mainly with guys. We have roughly forty employees [and] about three technical females on the team. So on a day-to-day basis, you are working in a male-dominated environment."

Alta Saunders, Zindi community member

"There were twenty-eight people in my course, but only five women. I think that today women are fully not part of society. We are still fighting for women to be included in other jobs, even outside of AI. So if women are not included in other more traditional sectors, imagine what it is like in this niche. So it's difficult."

Ella Odounaro, Zindi community member, Master's in Data Science, Big Data and AI at ENPHB of Yamoussoukro, Cote D'Ivoire

"Although there have been direct efforts to help grow [the number of] women in the field, there needs to be better mentoring. Sometimes we are usually a bit intimidated, even at the workplace. The numbers [of women] are lower compared to my fellow men."

Stella Kimani, Zindi community member

"There's a lot of biases generally when it comes to gender, especially for women in Africa. One major building block for those biases is biased datasets. We know AI is built on datasets. And the challenge with the dataset that is mostly available is it's not gender diverse, meaning that a lot of the data that is collected is from male contributors and not female contributors."

Rebecca Ryakitimbo, Responsible AI Fellow, Stimson Centre

Policy: Shaping Africa's AI innovation ecosystem

The policy environment is a crucial force shaping the trajectory of AI innovation clusters in Africa and their impact on youth employment. In recognition of the transformative power of AI, an increasing number of African nations and continental bodies are formulating national strategies dedicated to its development and implementation. The African Union (AU) is working towards a continental AI strategy, aiming to create a unified approach to AI governance across member states.[22] Meanwhile, Algeria, Benin, Ghana, Mauritius, and Senegal have officially adopted comprehensive national AI strategies, and other national governments are in the process of drafting similar strategies.[23] Six countries—Egypt, Ghana, Kenya, Nigeria, Uganda, and Zimbabwe—plan to create AI laws, and fifteen have established an AI task force or expert body.[24]

22 African Union, "African Ministers Adopt Landmark Continental Artificial Intelligence Strategy, African Digital Compact to Drive Africa's Development and Inclusive Growth."

23 Tech Hive Advisory and Center for Law and Innovation, "State of AI Regulation in Africa Trends and Developments."

24 Tech Hive Advisory and Center for Law and Innovation, "State of AI Regulation in Africa Trends and Developments."

Experts offered mixed insights into how the policy environment is impacting the development of AI innovation ecosystems across Africa. While the continent is still in the early stages of crafting and implementing comprehensive AI policies, interviewees highlighted both policy's current influence and the potential for future impact. A recurring theme in expert interviews was the need for a policy environment that prioritizes innovation and allows for experimentation before imposing strict regulations. Respondents felt that this approach ensures that policy does not stifle creativity and allows for the emergence of novel AI solutions tailored to the African context.

Policy as a catalyst for growth and coordination

Respondents noted how governments play a pivotal role in bringing together various stakeholders within the AI ecosystem through their convening power. As Dr. Njeri Ngaruiya Ng'ang'a notes, a strong government presence acting as a catalyst enables the convening of all aspects of the ecosystem in a coordinating manner.

"So as much as I say that we have to bring in the government because of policies, we have to bring in the tech companies to ensure that they're actually building for [the local context]. We also have to bring [in the perspective of] the people who are actually affected. So that means you have [to involve] people who have an agricultural [background], agricultural officers from the government, [and] maybe people from the different agricultural, public and private spaces."

Dr Njeri Ngaruiya Ng'ang'a, Head of Research, Qhala

Strategic direction and focus

AI policies can provide a clear strategic direction for AI development, outlining national priorities and guiding investments towards specific areas of focus. Increasing governmental attention to AI-related policy signals a growing recognition of AI's importance and the need for strategic guidance.

"The [government] is trying to come up with these policies that will guide the development of those innovations, which will act as landmarks or benchmarks. Once we are implementing these solutions because at the end of the day, as the Ministry of Health of the Ministry of ICT, they are the regulators of the technologies that are being developed around digital tools, of which AI is part of that."

Dr. Rose Nakasi, Head, Makerere University AI Health Lab

"We see a lot of solutions emerging in the health and agriculture sectors, in tech for social good, because donors are investing money there."

Rebecca Ryakitimbo, Responsible AI Fellow, Stimson Centre

Sector-specific policies

Dr. Ndiaye pointed out the potential benefits of developing sector-specific AI policies tailored to the unique opportunities and challenges of different industries, such as agriculture, healthcare, and finance:

"We have a lot of projects on AI policies on innovation on talent acquisition. There are some sectoral in agriculture, tourism, culture, and the environment. For sectoral data-related policies, we try to find problems that AI could solve. So we have data and we deal with all stakeholders companies, public sector, NGO, academics, et cetera to identify the pain point for each sector and see if AI could help to solve those pain points."

Dr. Seydina Moussa Ndiaye, Program Director FORCE-N, Cheikh Hamidou Kane Digital University

"What we've seen [in Tanzania] is the impact sectors like health and agriculture have gotten the most attention, and this is for multiple reasons. One of the biggest reasons being financial donors are willing to fund the social impact sectors. What this means is we are seeing a lot of startups emerging out of these impact donor-driven programs. And that's not just for AI, that's the startup ecosystem as a whole. Although, now we're starting to see a few more outside of these as people are realizing that's not truly sustainable and donor-driven can only last so long."

Essa Mohamedali, Tanzania AI Community

This approach allows for more targeted interventions and better addresses the specific needs of each sector. Some work in this regard emerges from donor-funded policy development. For example, Canada's IDRC finances hubs in different countries to support policy development, innovation, and talent acquisition in specific sectors like agriculture and public policy.

Lack of understanding and awareness

While some positive examples and opportunities were highlighted, several respondents pointed to a lack of a deep understanding of AI and its potential implications for the economy and society. This lack of awareness can lead to policies that are either too restrictive, stifling innovation, or too lax, failing to address potential risks and ethical concerns. Dr. Megan Yates noted the limited engagement between policymakers and AI professionals, researchers, and entrepreneurs:

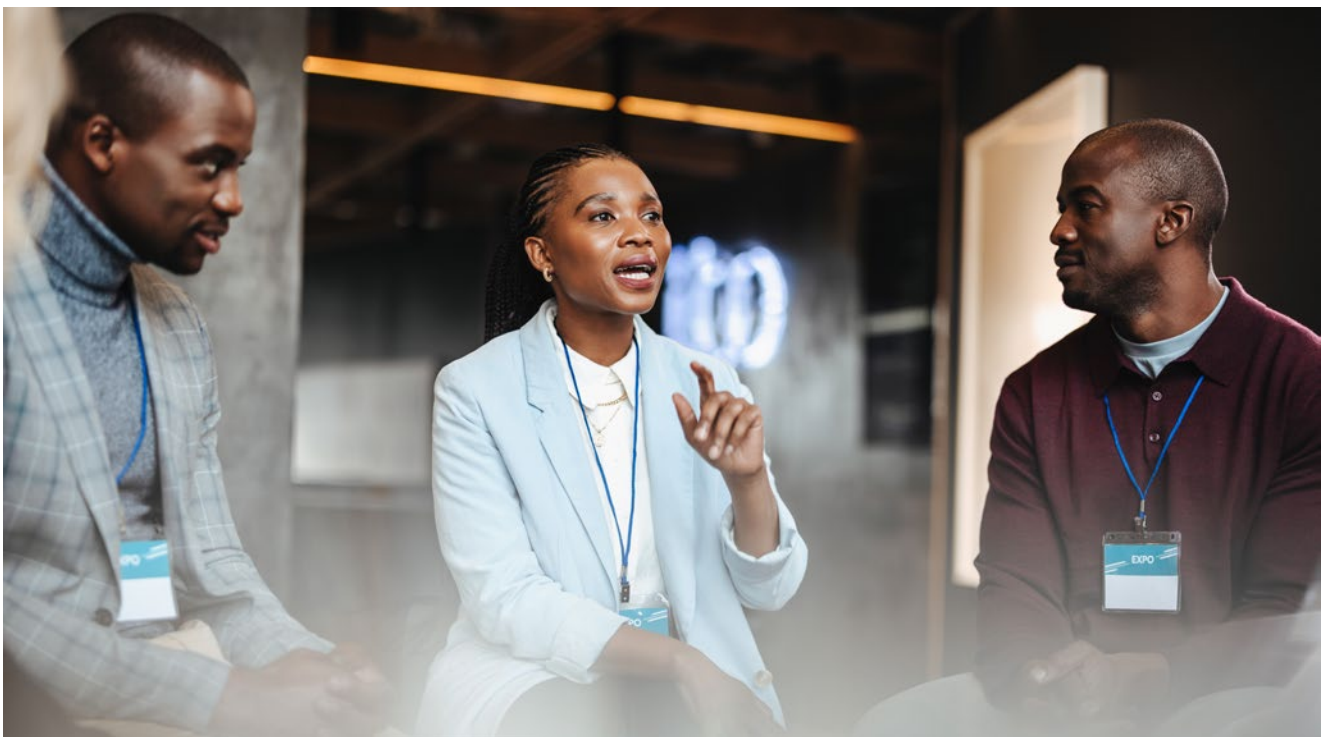
"What often happens is governments not calling in practitioners and people that actually do stuff. There's people who talk about things like bringing in real practitioners that are actually working on the problems in an organization. But when governments don't organize and really work with practitioners, there's a risk that the emerging policies are just unworkable, they're not practical, they're not going to make sense and they're going to be so restrictive and stifle innovation."

Dr. Megan Yates, Cofounder, Zindi

Conversely, convening multi-stakeholder forums strengthens policy that benefits the AI innovation ecosystem. As an instance of effective collaboration, Dr. Deji Ajani emphasized that the Nigerian government's move to include innovators in policymaking is a positive step and has influenced effective policymaking.

Building Pan-African collaboration

Given the shared challenges and opportunities across the continent, fostering collaboration and knowledge sharing among African countries is essential to accelerate progress in AI. Policymakers can establish regional frameworks for data sharing, skills development, and research collaboration to amplify the impact of their efforts. This aligns with Athman Ali's observation of conversations within the East African community regarding regional approaches to AI development, including the establishment of centers of excellence.



Big Tech: Advancing AI in Africa through myriad channels

Big Tech corporations are playing a significant role in shaping AI innovation clusters in Africa, though their involvement presents various complexities. Major multinational corporations including Google, IBM, Intel, and Microsoft have established AI research labs across the continent, providing essential resources, technical expertise, and employment opportunities for local talent.[25]

The contributions of these tech giants in Africa are substantial and multifaceted, encompassing major financial investments in digital infrastructure development. These include developing cloud computing infrastructure that provides vital access to platforms and services essential for AI research and deployment, establishing data centers to increase local computing power[26] and storage capacity for complex AI models, and investing in undersea cable infrastructure[27] to enhance internet connectivity and data transfer speeds.

Beyond infrastructure, these companies are actively developing AI solutions that address specific challenges faced by African communities in sectors such as healthcare, agriculture, education, and finance. They also promote regional knowledge exchange by engaging with African universities and research institutions, creating opportunities for collaboration and academic partnership. Additionally, these corporations offer comprehensive training programs and workshops aimed at developing and upskilling local AI professionals,[28] contributing to the growth of Africa's technical workforce.

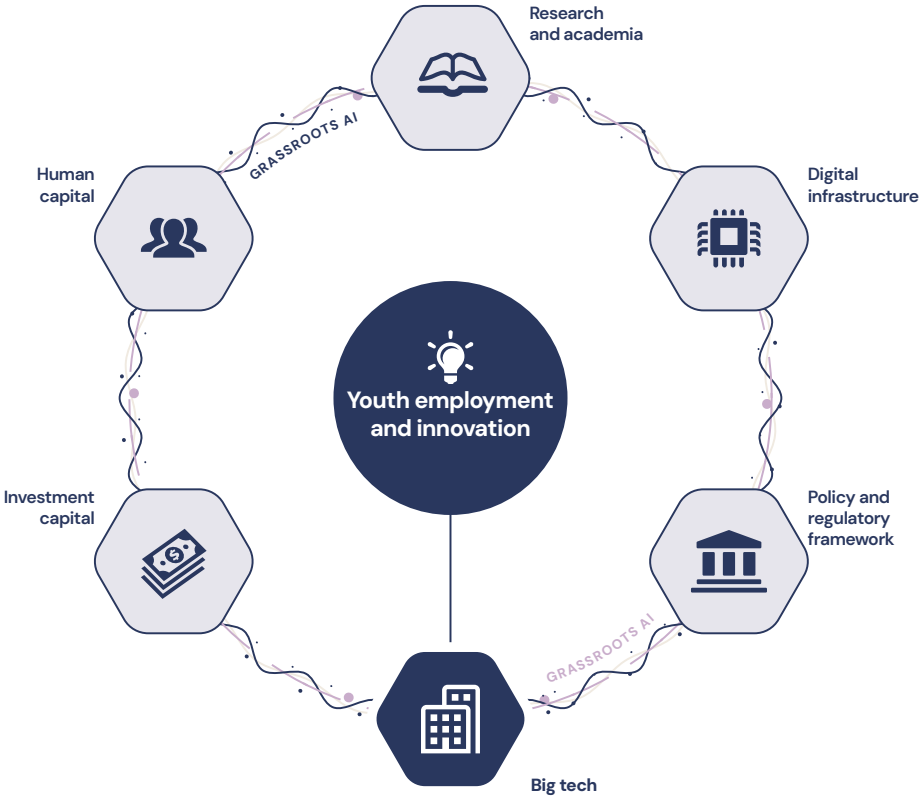
Interviewees offer varied perspectives on the role of Big Tech companies in the African AI ecosystem, highlighting both the potential benefits and inherent risks. While Big Tech investments and initiatives offer valuable resources and opportunities, it is crucial to address concerns about monopolization, data exploitation, and alignment with national priorities.

25 Dean and Cisse, "Google AI in Ghana"; IBM, "Celebrating a Decade of IBM Research Innovation in Africa"; AfriLabs, "Intel and AfriLabs Unite to Propel African DeepTech Ecosystem"; Microsoft Source, "Microsoft and G42 Announce $1 Billion Comprehensive Digital Ecosystem Initiative for Kenya."

26 MicrosMicrosoft Source, "Microsoft and G42 Announce $1 Billion Comprehensive Digital Ecosystem Initiative for Kenya."

27 Gajria, "The Equiano Subsea Cable Has Arrived in Togo, First Stop in Africa."

28 Brittin, "Africa's AI Moment."



Dr. Chinasa Okolo highlighted the potential benefits of Big Tech labs in fostering local research and development. She suggested that these labs can provide opportunities for local researchers to engage in cutting-edge work, leveraging their understanding of local contexts to develop AI solutions relevant to African communities.

"In terms of prioritizing the involvement of local researchers—these researchers have lived their entire lives in these countries and know how best to navigate many of these issues. Being established in a very premier institution like Microsoft or Google or IBM, for example, can help these researchers highlight local issues and be able to implement homegrown solutions that actively address these issues."

Dr. Chinasa Okolo, Fellow, Brookings Institution

"There are all these Big Tech actors that are creating labs. I don't know if you could call them centers of excellence—they play a key role in catalyzing the kind of ecosystem that could be robust."

Kevin Simmons, LoftyInc Capital Management

Essa Mahomedali, a cofounder of Tanzania AI Community, discussed the impact of Big Tech investments on the talent pool. He argued that, in the short term, the presence of companies like Google and Microsoft can lead to "brain drain," as talented individuals are drawn to the prestige and opportunities offered by these global giants.

"If you give a young graduate or a talented developer the opportunity to work for a local bank or to work for Microsoft or Google, they're not going to think twice about it."

Essa Mohamedali, Cofounder, Tanzania AI Community

However, Mohamedali also suggested that this brain drain could have a positive long-term impact. Individuals who gain experience in Big Tech environments may eventually return to the local ecosystem, bringing with them valuable skills and connections that can contribute to its growth. He envisions these individuals "*starting their own companies, hiring local talent, and mentoring them, ultimately bringing up the entire ecosystem as a whole*."

"Private companies, large multinationals, large tech companies, Meta or Microsoft or Google are doing a lot of work in that area, from providing datasets that people can use to build models to financing AI-enabled startups to providing capability training or support to start off. So I'd say large tech companies are also involved in the Nigerian tech ecosystem. For example, Google has recently contributed to a fund by the Nigerian Ministry of Digital Economy for AI-enabled startups earlier this week."

Ojoma Ochai, Managing Director, Co-Creation Hub Africa

While such initiatives may appear beneficial, another interviewee expressed skepticism about the motivations of Big Tech companies, questioning the extent to which their support is "*self-interested or benevolent*." This skepticism reflects a broader concern about the potential for Big Tech companies to exploit African markets for profit, raising questions about the long-term sustainability and inclusivity of their involvement.

Overall, interviewees' perspectives suggest that the relationship between Big Tech companies and the African AI ecosystem is complex and multifaceted. While Big Tech investments can provide valuable resources, skills development, and research opportunities, there are also concerns about brain drain, the potential for Big Tech companies to prioritize their own interests over local concerns, and the need for transparency and accountability in their engagement. The overall sentiment points to the need for a cautious and strategic approach to navigating Big Tech's presence in Africa, ensuring that their involvement benefits local communities and contributes to the development of a sustainable and inclusive AI ecosystem.

Investors and donors: Funding the future of African AI

Private investors, African governments, and donor agencies play a multifaceted role in the development of AI innovation ecosystems across Africa. They not only provide crucial financial resources but also shape the direction of innovation by prioritizing specific areas of investment. Venture capital (VC) has been a significant driver of AI investment in Africa, with funding for DeepTech startups, including AI, rising from $86 million in 2015 to $1.2 billion in 2023.[29] More than 300 investors are active in the African AI innovation ecosystem, with 65% of these located in Africa.[30] The ecosystem is supported by more than 127 innovation hubs, with South Africa hosting the largest concentration (22%), followed by Nigeria (12%), Egypt (12%), Kenya (10%), and Tunisia (5%)).[31] Philanthropic organizations like the Mastercard Foundation, IDRC, FCDO, the Bill and Melinda Gates Foundation, and USAID have also played crucial roles advancing AI in Africa.

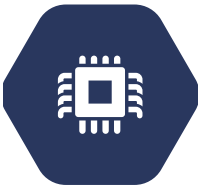
29 BRAIN, "Mapping the African DeepTech Landscape: Building the DeepTech Foundations in Africa."
30 AVCA, "Q1 2024 Venture Capital Activity in Africa."
31 BRAIN, "Mapping the African DeepTech Landscape: Building the DeepTech Foundations in Africa."

Investors and donor agencies are key sources of funding for AI initiatives on the African continent, supporting a range of activities.

- **Infrastructure development:** Donors and Big Tech recognize the importance of investing in infrastructure for the crucial role it plays as an ecosystem enabler. Investments in innovation hubs, research facilities, and data centers help create the physical foundation for a thriving AI ecosystem.
- **Startup funding:** Investors provide capital for AI-enabled startups, enabling them to develop and scale their products and services. This funding can take various forms, from grants and seed investments to VC funding for later-stage startups.
- **Human capital development:** Donors like the Mastercard Foundation invest heavily in human capital development initiatives, particularly those focused on youth employment. They fund training programs, scholarships, and fellowships that aim to build a pipeline of skilled AI professionals.
- **Research and development:** Donor agencies often support R&D initiatives in AI, fostering innovation and knowledge creation. This funding is typically directed towards universities, research institutions, and collaborative projects that aim to advance the field of AI in Africa.
- **Ecosystem building:** Organizations like IDRC invest in building comprehensive AI innovation ecosystems. Their approach involves working with universities and strategically engaging various stakeholders to create a supportive environment for AI development.

African governments are increasingly investing in AI initiatives, recognizing its importance. For example, Nigeria launched the Nigeria Artificial Intelligence Research Scheme, which provides grants to AI researchers and startups, and South Africa established the Artificial Intelligence Institute of South Africa to support AI research and development. These government efforts, combined with private and philanthropic investments, are creating a dynamic environment for AI innovation and development across the continent, addressing local challenges and fostering technological growth.

Infrastructure: The foundation for Africa's AI ambitions



In order for Africa to achieve the full benefits of the technological efficiencies and economic dividend that AI promises, some essential digital infrastructure requirements need to be met, including:

- Reliable and affordable internet connectivity
- Robust computing power and data centers
- Access to quality data and open data repositories
- Strong cybersecurity measures to safeguard systems and data

Many African countries face basic infrastructural challenges, such as inadequate electricity, as well as specific digital infrastructure barries such as limited internet connectivity and insufficient computing power, which hinder AI development and deployment.[32] The majority of African countries lag behind global AI leaders China and the United States in areas like network readiness and global connectivity that are indicative of Africa's readiness for AI deployment and adoption at scale.[33]

32 Bayou and Mwaya, "The Missing Piece in Africa's AI Blueprint."
33 Portulans Institute, "Network Readiness Index 2023: Trust in a Network Society: A Crisis of the Digital Age?"

Access to computing is a significant barrier

Research participants frequently emphasized that robust infrastructure is fundamental to nurturing thriving AI innovation ecosystems in Africa. They highlighted the continent's significant infrastructure deficit and how it impacts various aspects crucial for AI development. One critical area is physical infrastructure, where interviewees pinpoint the lack of sufficient computing capacity as a major obstacle. Without such local infrastructure, the capacity to develop and scale AI solutions is severely constrained.

"An issue is that computing capacity is limited on the continent. So there are no GPUs. Well, there are not that many GPUs. So the computing capability to build large language models or large-scale hardcore AI startups is not ubiquitous on the continent."

Ojoma Ochai, Managing Director, Co-Creation Hub Africa

"So infrastructure is a definite lever in AI because of the computer, right? It's not easy in the African context to access the kind of computing that is needed to come up with truly innovative job-creating possibilities. It's very expensive."

Athman Ali, Senior Advisor and Global Lead, Digital and Tech Transformation, Tony Blair Institute for Global Change

"I can't even point to an African computer center at the moment where you can easily access free or affordable computers."

Kevin Olufemi, Data Scientist, Zindi

Affordable internet connectivity and electricity

Beyond computing capacity, reliable and affordable internet connectivity is another cornerstone of AI innovation. Despite advancements in expanding internet access across Africa, coverage remains inconsistent, leaving many regions without dependable high-speed internet.

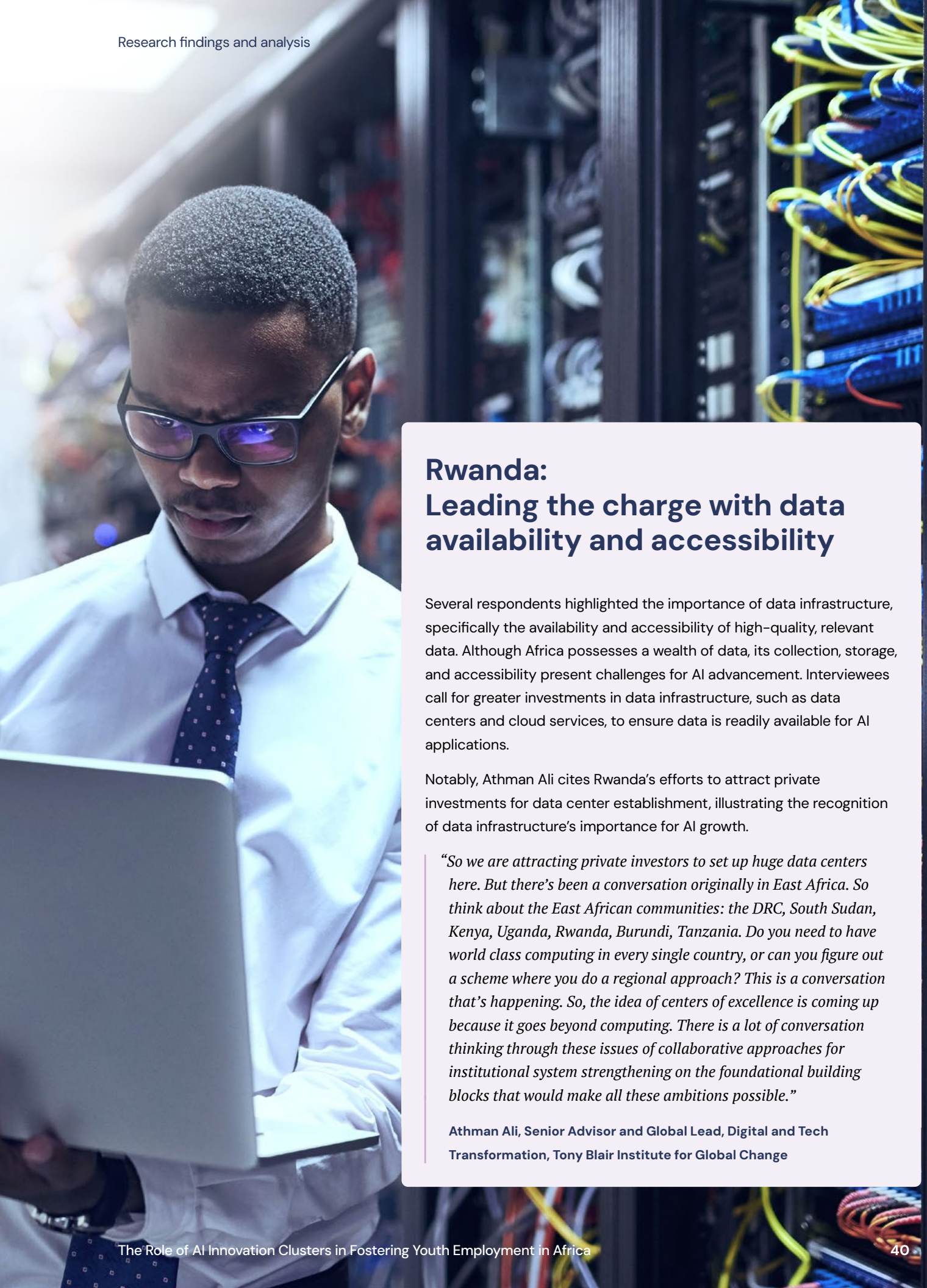
"Africa has a lot of basic problems before we get to the problems that AI can solve. If I'm worried about electricity, and worried about water, and worried about food—you have to meet all those needs before worrying about posting content on TikTok. We don't even have electricity. Africa has these basic problems that we need to first try to resolve in parallel in order to develop."

Cobih Obih, HoAQ

A number of respondents acknowledged the challenges posed by unreliable electricity supply in parts of Africa. Consistent power is indispensable for supporting the data centers and computing infrastructure essential for AI, yet inconsistent electricity access hampers the seamless operation of AI-related activities.

"Electricity being unstable is a big thing. We have had issues with electricity preventing us, obviously having access. Whether it's some of Microsoft services going down or just companies not being able to manage if they have on-premises services to keep things up and running."

Alta Saunders, Zindi community member



Rwanda: Leading the charge with data availability and accessibility

Several respondents highlighted the importance of data infrastructure, specifically the availability and accessibility of high-quality, relevant data. Although Africa possesses a wealth of data, its collection, storage, and accessibility present challenges for AI advancement. Interviewees call for greater investments in data infrastructure, such as data centers and cloud services, to ensure data is readily available for AI applications.

Notably, Athman Ali cites Rwanda's efforts to attract private investments for data center establishment, illustrating the recognition of data infrastructure's importance for AI growth.

> *"So we are attracting private investors to set up huge data centers here. But there's been a conversation originally in East Africa. So think about the East African communities: the DRC, South Sudan, Kenya, Uganda, Rwanda, Burundi, Tanzania. Do you need to have world class computing in every single country, or can you figure out a scheme where you do a regional approach? This is a conversation that's happening. So, the idea of centers of excellence is coming up because it goes beyond computing. There is a lot of conversation thinking through these issues of collaborative approaches for institutional system strengthening on the foundational building blocks that would make all these ambitions possible."*
>
> **Athman Ali, Senior Advisor and Global Lead, Digital and Tech Transformation, Tony Blair Institute for Global Change**

Innovation hubs as nodes of innovation and access bridges

Finally, respondents acknowledged the important role that innovation hubs are playing in bridging access to basic infrastructure like electricity and internet connectivity. Innovation hubs and accelerators were mentioned often and recognized for their role bringing together various AI ecosystem actors, offering access to resources, networking opportunities, and support for startups. However, some concerns emerge regarding the limited resources available to these hubs and their uneven distribution across the continent.

Interviewees advocated for increased investment in AI-related infrastructure in Africa, encompassing both public and private sectors. This includes funding and technical support for physical, data, and institutional infrastructure development. They posited that donors and development partners can play a crucial role in bridging the infrastructure gap and accelerating AI innovation in Africa.

Ultimately, interviewees emphasized a multifaceted approach to bolstering AI infrastructure in Africa, encompassing investments across physical, data, and institutional domains. By addressing these infrastructure gaps, African countries can cultivate a more conducive environment for AI innovation, unlocking its potential to drive economic growth, advance social development, and empower young generations to thrive in the AI-driven economy.

African AI startups: Leveraging tools, navigating challenges

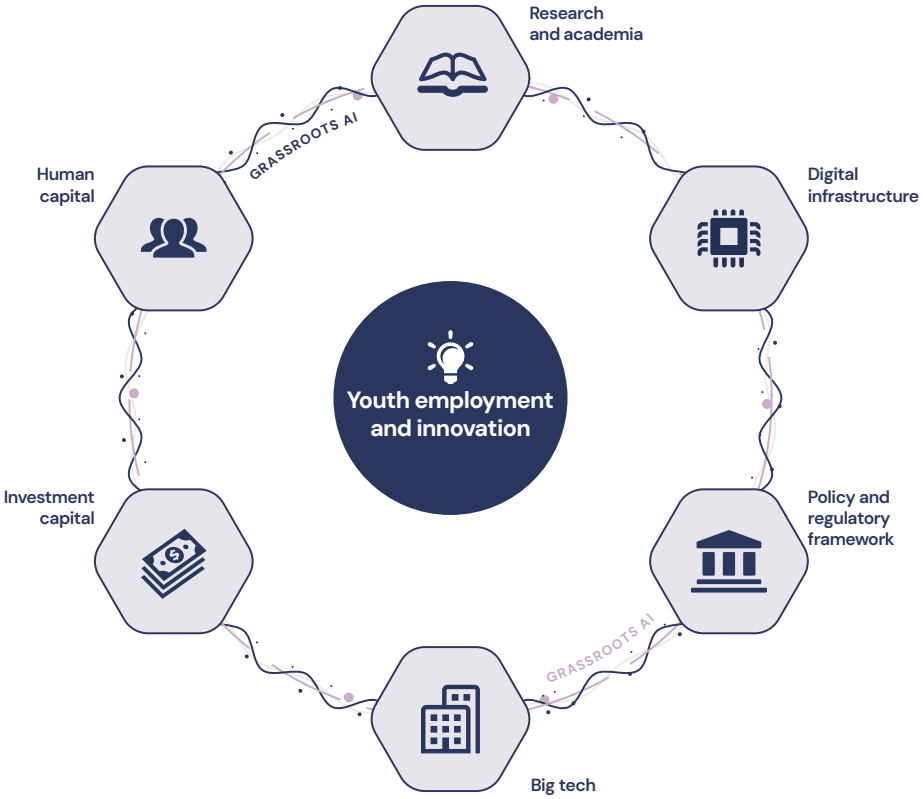
Tech startups and MSEs drive innovation and create job opportunities for skilled youth. Interviewees highlighted the important role that AI tech startups play in shaping the AI innovation ecosystem in Africa and contributing to job creation, despite facing various challenges, including resource access, funding, and sustainability.

Driving innovation and addressing local needs

AI tech startups are at the forefront of developing innovative AI solutions tailored to specific challenges faced by African communities. They often leverage their understanding of local contexts and needs to create products and services that have the potential to make a real impact.

- **Creating employment opportunities:** As these startups grow and succeed, they create direct employment opportunities for AI professionals, software developers, data scientists, and other skilled workers. This job creation contributes to economic growth and helps to address youth unemployment on the continent.
- **Strengthening the AI talent pipeline:** AI tech startups often prioritize hiring local talent, contributing to the development of a skilled AI workforce in Africa. They provide opportunities for young people to gain practical experience, mentorship, and exposure to cutting-edge AI technologies, further strengthening the talent pipeline for the future.
- **Fostering a culture of entrepreneurship:** The success of AI tech startups inspires other aspiring entrepreneurs and innovators, fostering a vibrant startup culture that encourages risk-taking and experimentation. This dynamic environment contributes to the overall growth of the AI innovation ecosystem in Africa.
- **Collaborating with other stakeholders:** African AI tech startups are often engaged in collaborations with other stakeholders in the ecosystem, such as universities, research institutions, and large corporations. These partnerships facilitate knowledge exchange, resource sharing, and the development of more robust and sustainable AI solutions.

Despite these positive contributions, AI tech startups in Africa face several challenges, one of which is access to finance. Securing adequate funding to support research, development, and scaling operations is a significant hurdle for many AI tech startups. Like the rest of the AI ecosystem on the continent, finding qualified AI professionals with the right skills and experience can be a major challenge. Startups often find themselves competing for scarce, expensive talent with Big Tech and incumbent corporations locally and internationally that can pay rates of remuneration that are out of their reach.



Many startups are leveraging existing AI tools and APIs rather than building their own solutions. Dr. Ndiaye explained that in Senegal and across Africa, "*many startups use APIs from international companies like OpenAI or Google*" due to "*limited access to talent, computing resources, and data*." This reliance on external tools hinders the development of advanced and unique solutions tailored to local contexts.

While facing challenges, African startups are also beneficiaries of support systems like innovation hubs, which provide resources, mentorship, and networking opportunities. These hubs play a vital role in nurturing the growth of AI ventures.

"There are a lot of innovation hubs across Africa that are supporting startups to venture into AI."

Kevin Olufemi, Data Scientist, Zindi

"I really love the concept of innovation in apps. An innovation hub is that physical place where an ecosystem comes together. By ecosystem, I mean the innovators for entrepreneurs, the talents for the young people that want to work with these innovations, the donor community, VC, commercial funds, policymakers, academia—they come together through these innovation hubs. And I've noticed there's a lot of incentive alignment around these hubs because if you are in one university, then the next university also wants to have exactly the same thing."

Pascal Murasira, Founding Managing Director, Norrsken Hub

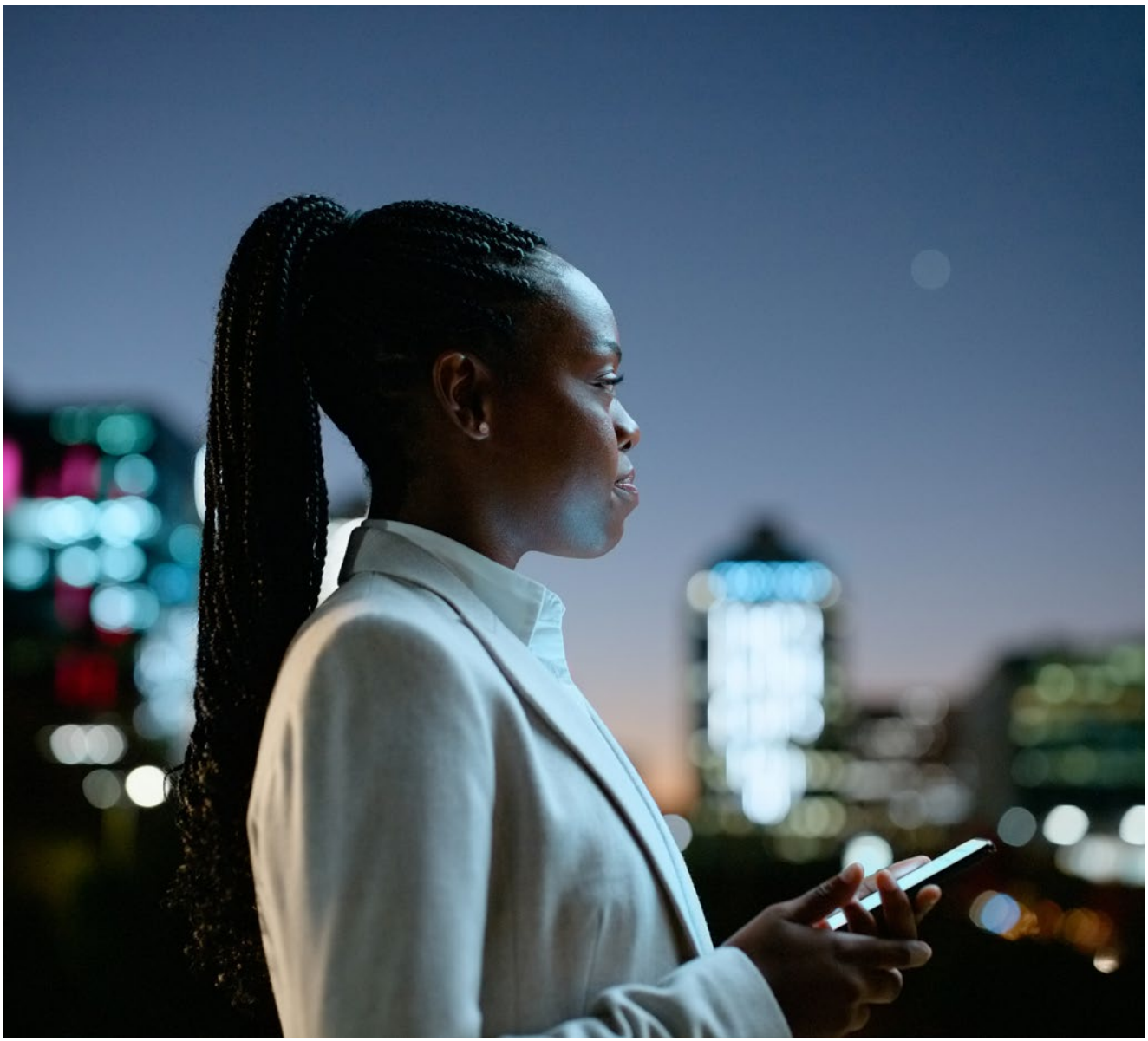
"CcHub hosts a few dozens of tech startups, including tech startups using AI, and provides a program of events, activities, connection—brokering connections between the emerging ecosystem. We have been conducting various studies related to AI opportunities and publishing those studies and circulating them to our networks. We also piloted a course that we call business 'AI for Business' to educate private sector stakeholders on the potential of AI."

Ojoma Ochai, Managing Director, Co-Creation Hub Africa

While AI startups are viewed as a source of innovation and job creation, they also face significant challenges, including limited access to funding, infrastructure constraints, and difficulty attracting and retaining skilled talent. Although there is growing interest in AI startups, many struggle to evolve past proof of concept and often falter before they are able to create a large number of jobs. Dr. Nakasi cited the example of Ugandan AI startups that emerge from Makerere University: "*One of the major hindrances is really having enough start-up funds to be able to go beyond the proof-of-concept level*." She goes on to highlight the Ugandan ecosystem: "*There are very few startups that I know that have stood the test of time. Unless someone is starting up with some initial kind of funding, it becomes a little bit hard. One that I know about is Sunbird [a Uganda AI startup that was spun out of the university environment into a viable entity]*."

Despite the challenges, there is optimism about the potential of AI startups in Africa. Pascal Musarira highlights the positive impact of AI solutions deployed by startups in sectors like agriculture, citing their effectiveness in "*predicting diseases and improving agricultural practices*." However, securing funding and achieving sustainability remain significant hurdles. Dr. Ndiaye observes that "*many emerging AI startups in Senegal face significant difficulties*," attributing their struggles to "*limited funding, market access challenges, and the complexities of navigating the business landscape*." This underscores the need for greater investment and support to foster the growth and ensure the long-term viability of promising AI ventures in Africa.

In conclusion, AI tech startups are playing a critical role in shaping AI innovation ecosystems and driving job creation in Africa. By fostering innovation, developing local talent, and collaborating with other stakeholders, these startups are contributing to the continent's economic growth and social development. Continued support from policymakers, investors, and the broader ecosystem is essential for these startups to thrive and unlock the full potential of AI in Africa.



Recommendations for strengthening Africa's AI innovation clusters

"The future of work in Africa will be shaped by how well we harness the potential of AI while addressing its challenges."

Misbawu Abdallah, Zindi community member

AI innovation clusters hold significant potential for addressing youth unemployment in Africa. By addressing key challenges and implementing targeted recommendations, these clusters can become powerful engines of job creation and economic growth.

Successful African innovation clusters should include:

- An **influential cluster sponsor** that convenes multiple stakeholders around a shared strategic goal. This can be a donor, a government agency, or an AI community platform.
- A **nucleus** around which diverse stakeholders congregate. At times this is the same as the sponsor, but this is not always the case. In examples touched on by the research, academic institutions featured strongly, as did startup accelerators and innovation hubs. It is imperative that this nucleus then aggregates policy actors, private sector actors, research professionals, donors, and funders.
- African innovation clusters of note typically provide **access to core digital and physical infrastructure**. These could be university labs, Big Tech labs, or innovation hubs.
- **Skilled human capital** in the form of academics, corporate or university researchers, and AI practitioners from industry is central to the development of the AI initiatives and upskilling that emerges from innovation clusters.

To fully realize the potential of AI innovation clusters, a concerted effort from governments, educational institutions, private sector actors, and civil society is required. Given the unique and pivotal role that grassroots AI plays in the African context, it is critical to pay special attention to strengthening grassroots initiatives that are already aggregating AI-professionals and scholars around various important ecosystem building activities such as capacity building, job placement, and research dissemination.

By fostering a robust AI innovation ecosystem, Africa can position itself at the forefront of the global AI revolution, creating meaningful employment opportunities for its youth and driving sustainable economic development. These recommendations are aimed at philanthropy and the donor community, government, and the private sector, all of whom are well positioned to impact almost every part of an AI cluster in diverse ways.

Seed tightly coordinated, strategically orchestrated innovation clusters.

First and foremost, strengthen and seed AI innovation clusters through targeted government and private sector investment. It is in the multi-stakeholder collaboration clusters create that robust innovations and initiatives are developed.

- The **IDRC AI4D initiatives** in various countries represent one archetype of donors facilitating the development of new innovation clusters with research and development at the core. They convene national actors from academia, government, and the private sector to deliver change.
- **Tanzania AI Community** presents an alternative and similarly effective archetype. The Community has influenced policy development, facilitated skills development in concert with both universities and informal activities, and fostered the seeding of a vibrant AI startup ecosystem.
- The **Kenyan government's billion-dollar partnership with Microsoft** represents a regional innovation cluster that will facilitate infrastructure development, skills development, and research collaboration among universities in the East Africa region.
- On a smaller and more surgical scale, the **Makerere University AI Health Lab** offers yet another archetype—an innovation cluster that aggregates public healthcare actors, researchers and academicians, the Ministries of ICT and Health, and startup founders to create healthcare-oriented AI solutions.

Foster a collaborative ecosystem.

The exact composition of innovation clusters varies by region and sectoral area of focus but must be strategically orchestrated to unlock the promise that a cluster lens presents for economic growth. Important considerations for robust innovation clusters include:

- **Leverage government as a catalyst.**
  Leverage government's role in convening and coordinating different stakeholders within the AI cluster, including startups, academia, research institutions, and the private sector. Encourage a strong government presence to facilitate partnerships and drive progress.
- **Support innovation hubs and accelerators.**
  Involve existing hubs and accelerators, which play a vital role in providing resources like stable electricity, internet access, and mentorship. Invest in establishing new hub initiatives specifically focused on AI, fostering a collaborative environment for innovation.
- **Develop shared service initiatives.**
  Encourage the emergence of shared assets and services initiatives by multiple stakeholders, for example, the provision of access to computing resources and expertise, possibly brokered with large technology providers, to an innovation cluster.
- **Foster university–industry collaboration.**
  Universities are uniquely placed as conveners and cluster orchestrators. Strengthen the link between academia and corporate organizations within clusters. Encourage partnerships between universities and companies to facilitate knowledge transfer, talent development, and commercialization of research.
- **Leverage existing grassroots AI initiatives and organizations.**
  Recognize the crucial role of both formal and informal data science communities in catalyzing the AI ecosystem and engage these communities in the collective of cluster stakeholders. Partnerships with organizations like Zindi and other informal AI academies, which are already actively involved in upskilling, talent development, and connecting AI professionals across Africa, would also widen the net of human capital providers.

Invest in foundational infrastructure.

- **Establish data centers and computing infrastructure.**
  Attract private investors to establish robust data centers in Africa, considering a regional approach to optimize resource allocation across countries. Address limited access to computing resources, which is essential for developing and running AI models, particularly large language models.
- **Develop digital infrastructure.**
  Recognize that a lack of basic digital infrastructure, like reliable electricity and internet connectivity, can be a barrier to AI adoption in Africa. Investment in improving these fundamental aspects is critical to enable widespread AI development and utilization.

Prioritize talent development and upskilling.

- **Support targeted upskilling programs.**
  Invest in upskilling programs that focus on developing practical AI skills and preparing individuals for the demands of the AI job market. Move beyond traditional university scholarships and focus on programs tailored to industry needs.
- **Create training for trainers.**
  Empower local AI communities and organizations to train others, creating a cascading effect of skills development. Leverage existing networks to expand the reach of training initiatives.

Facilitate research and policy development.

- **Support contextualized AI research.**
  Invest in research that explores the impact of AI technologies within specific African contexts. Support studies that investigate potential ethical implications, social impacts, and risks of AI in diverse African settings.
- **Nurture a supportive policy environment.**
  Promote policies that encourage AI innovation while addressing potential risks and ethical concerns. Engage policymakers to create a regulatory landscape that fosters responsible AI development and adoption.

Focus on African-led solutions.

- **Address data bias.**
  Recognize that existing foundational models often lack African data, potentially leading to biased outcomes. Invest in initiatives to digitize and incorporate African data into AI development, promoting fairness and accuracy in AI applications.
- **Support locally relevant applications.**
  Encourage the development of AI solutions tailored to address the unique challenges and opportunities present in African communities. Support startups focused on solving local problems, promoting self-reliance and reducing dependence on imported technologies.

By implementing these strategies, stakeholders can contribute to the deliberate development of thriving AI innovation clusters across Africa. These clusters can serve as engines of economic growth, job creation, and social progress, empowering African youth to harness the transformative power of AI. Well-designed and coordinated AI innovation clusters can create employment pathways for youth that are crafted to respond to their socioeconomic and geographic context while propelling them into the emerging digital economy from a position of strength.

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