



BRAIN.

MAPPING THE AFRICAN DEEPTech LANDSCAPE

Building The Deeptech Foundations In Africa

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About

BRAIN is a Pan-African program aiming to support DeepTech foundations in Africa through a comprehensive modular approach. It is run by Open Startup in partnership with MIT Legatum Center and MIT Africa, and funded by Digital Africa, Africa Grow, IFC and the US Embassy of Tunis, with the support of Instadeep and Africinvest. One of the key components of BRAIN, powered by Digital Africa, is Research and Advocacy as it embraces the fact that to grasp the existing and forthcoming potential of DeepTech within Africa, it is imperative to meticulously chart its terrain, identify trends, and recognize key players to identify potential synergies. This comprehensive mapping endeavour is crucial for facilitating well-informed choices and strategic advancement.

Brain Program Partners



Study Partners

Study Lead/Implementing Partner: **Open Startup** (OST) is a non-governmental organisation that fosters innovation and capacity building through entrepreneurship, education, and cross-cultural exchange, creating communities and connecting ecosystems across the Middle East and Africa (MEA). OST works toward leveraging networks and empowering entrepreneurs by providing them with world-class opportunities, programs, and resources.

Study Funding Partner: Digital Africa has the mission to reinforce African tech entrepreneurs' capacities by designing and deploying digital innovations on a large scale for the real economy. Acting as a catalyst, Digital Africa brings together a diverse set of partners committed to supporting African digital entrepreneurs, with Proparco being the primary partner. Our approach is based on a clear diagnosis of entrepreneurs' needs, directly derived from the field, to develop a set of programs around three main axes: 1) Capacity building for early-stage tech entrepreneurs, 2) Access to financing tailored for early-stage tech startup development, and lastly 3) 'Made in Africa' innovation policies facilitating the tech entrepreneurs emergence."

Research Partner: Briter Bridges is a fast-growing market intelligence and research firm focused on emerging economies. Briter has built the largest collection of visual publications on Africa and underserved markets and regularly provides data and insights to corporates, development finance institutions, governments, and investors. Briter's proprietary business data platform, Intelligence, is regularly used by thousands of public and private organisations ranging from the World Bank to Amazon and governments.

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Contributors

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Executive Summary

2023 was a watershed moment for DeepTech around the world. ChatGPT was launched, BioNTech acquired Instadeep, the first CRISPR-based treatment was approved and Nvidia became the newest trillion-dollar company. Funding to DeepTech startups exceeded 20% of all startup funding globally for the first time and many of the biggest deals were for DeepTech startups. Africa was no exception. More than a third of funding to startups in Africa went to DeepTech.

Yet, across Africa, the DeepTech startup ecosystem has lacked visibility. This is partly the result of the lack of data availability, but also the lack of a common language and definition of DeepTech for Africa that stakeholders can mobilise around. And there is good reason to address this. As this study shows, DeepTech is already playing a major role in Africa,

addressing some of the most complex and enduring development challenges on the continent. There are more than 300 active DeepTech startups that have already raised \$3 billion in funding over the last decade. These DeepTech startups are increasingly targeting high-impact industries such as health, agriculture, and cleantech.

This report on DeepTech in Africa aims to build on this existing momentum across the region by creating a common language that connects stakeholders across the sector and a comprehensive evidence base on the innovation and funding landscape that stakeholders can use to pioneer and shape DeepTech on the continent. It also delves deeper into the policy environment and key challenges constraining growth and offers a way forward for DeepTech in Africa.

The report highlights nine key findings:

1. DeepTech is on the rise in Africa, mirroring global trends but remains fragmented.
2. The maturity of DeepTech ecosystems differs widely across countries in Africa.
3. DeepTech startups are different from startups adopting DeepTech technologies.
4. DeepTech startups are applying emerging novel technologies to uniquely African challenges.
5. DeepTech founders are well educated, but mostly male, foreign educated and with limited business expertise.
6. Universities are powering the DeepTech innovation pipeline in Africa, but remain limited and constrained to effectively work with the ecosystem.
7. Unlike more developed markets, corporates have had limited involvement in shaping DeepTech in Africa.
8. Most government support for DeepTech falls into general innovation support, but some more targeted policies are emerging.
9. Funding gaps are present across all stages but the late stage presents the biggest challenge.

These findings highlight that the DeepTech revolution is well underway in Africa, and startups are primed to take advantage of the opportunity that it presents. To make it happen, stakeholders need better information and coordination, more capital, and fewer policy and regulatory hurdles to jump. If done right, this could not just unlock DeepTech in Africa, but a new frontier of innovation in Africa at a time when it is likely to be needed most.

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1. Introduction

Across the world, DeepTech is picking up momentum. In 2021, the DeepTech market revenue totalled more than \$430m and is expected to reach \$3.7bn in market value by 2032¹. A report from BCG highlights that DeepTech now accounts for 20% of the venture capital funding globally. Artificial Intelligence (AI) alone captured 25% of the total funding to startups in the US in 2023. While the United States, the UK, Japan, France and Germany are driving the majority of investment and innovation, Africa has not been left out of the DeepTech revolution. In 2023, funding to DeepTech startups accounted for a third of the total volume of funding to all startups in Africa.

Deep technology startups ("DeepTechs") strive to disrupt established markets or create entirely new ones by incubating, commercialising and scaling novel breakthrough innovations. This is no easy endeavour as DeepTech startups are often capital and resource-intensive and must both develop groundbreaking technologies while also cultivating new markets for their products.

But getting it right in Africa holds much promise. DeepTech startups are increasingly addressing some of the most complex and enduring development challenges on the continent by catalysing and providing alternative solutions for everything from increasing the sustainability of food production to reducing water scarcity and managing the burden of disease on the continent.

Breakthrough technologies like cellular agriculture have the potential to significantly reduce resource consumption and greenhouse gas emissions, offering a more sustainable method for food production. Advanced materials like superabsorbent hydrogels, capable of extracting moisture from humid air and holding water up to 150 to 1,500 times their dry weight, could provide a promising solution to rising water stress in arid regions. Quantum technologies can accelerate material sciences research, leading to innovations in energy and healthcare. Advanced semiconductor technologies like microelectronics and photonics could support progress in fields such as medical imaging and renewable energy solutions. If effectively applied these breakthrough technologies could expedite progress toward the 2030 Sustainable Development Goals (SDGs) where progress is increasingly falling off track.

¹ DeepTech Market, [Future Market Insights](#), 2022

The spillover effects from getting it right could also be massive. Technology-driven changes not only solve targeted problems but also foster entire ecosystems of opportunity by driving demand for high-tech jobs that have a multiplier effect on the broader employment opportunities in the economy. The strategic nature of Deeptech has made it a priority not just for investors and startups, but for governments as well. Many governments across the continent are developing policies around DeepTech generally and AI more specifically.

However, despite its importance, there is limited visibility on the DeepTech sector in Africa. Further, while it accounted for a third of the funding to all startups in Africa in 2023 based on Briter Intelligence data, it only accounted for 5% of deals. Two mega deals, Zipline and Instadeep, accounted for the majority of funding. Active stakeholders are not collaborating as they lack visibility on what others are doing or where to look for and assess the pipeline in the space. Even the definition of DeepTech remains unclear. In a sector requiring significant capital and expertise, this creates major barriers to its growth.

This report aims to address this data and intelligence gap and demystify DeepTech in the African context. It analyses the existing DeepTech ecosystem landscape in Africa looking at key stakeholders active in the space, examining the funding landscape to spot key trends as well as identifying the ecosystem challenges and opportunities to unlock innovation and investment in the space. While it covers the whole continent, it dives deeper into 11 markets including Benin, Egypt, Ivory Coast, Kenya, Morocco, Nigeria, Rwanda, South Africa, Togo and Tunisia.

The remainder of the report is divided into four sections:

- **Section 1: Introduction** outlines the background of the study, the objectives, and the methodology and taxonomy for research.
- **Section 2: State of the African DeepTech** provides an overview of the funding landscape, as well as key stakeholders and their role in the Deeptech ecosystem, including startups, investors, hubs, corporates, universities, and governments. The chapter also delves into the surrounding policy environment for DeepTech in Africa.
- **Section 3: Challenges and Opportunities** highlights some of the key challenges that limit DeepTech innovation across the continent and recommendations for how to address them.
- **Section 4: Key Findings** presents a summary of key findings from the data and interviews.

In addition, the [annexure](#) at the end of this study offers additional materials and tables about the DeepTech ecosystem.

Methodology

The research for this study adopts a mixed-method approach, combining quantitative and qualitative data. Quantitative data on the African DeepTech ecosystem is leveraged from Briter Intelligence 2.0 with complementary data through desktop research to fill the gaps. The data can be further explored on the [interactive dashboard](#) created for this study. Qualitative data is leveraged from insights captured through Key Informant Interviews (KIIs) conducted with 16 stakeholders active in the space as part of the study.

To comprehensively analyse the DeepTech ecosystem in Africa, the analysis categorises key stakeholders in the DeepTech ecosystem as follows:

1. **Startups:** Extracted from Briter Intelligence and additional desktop research. The selection criteria include startups primarily focusing on designing and developing DeepTech as their core product (e.g., Instadeep), as opposed to those simply adopting it in their products and services (e.g., Twiga). For these startups, available public funding data has been added. It should be noted that startups in this study are considered to be DeepTech if they have developed a relevant technology as part of their offering, even if they are more broadly categorised under other sectors or industries, such as health or agriculture.
2. **Investors and ecosystem enablers (hubs)**²: Collected based on the specific mandate to support DeepTech and their investment in the above DeepTech solutions (even if they are generally agnostic in their support).
3. **Corporates:** Included if they have invested in DeepTech startups, are involved in startup ecosystem support programmes especially those catered towards DeepTech, engage in partnerships with other DeepTech stakeholders, or possess R&D facilities focusing on DeepTech.
4. **Universities:** Selected based on the existence of research labs and university programs aimed at supporting research and development of DeepTech innovations developed by university students and entrepreneurs.
5. **Government initiatives:** Explored from two angles, the first being more general acts or policies that are conducive to driving innovation in general such as startup acts, and the second in terms of whether they have supportive policies for

² Ecosystem enablers include accelerators, incubators, innovation hubs, and venture builders

DeepTech innovations such as Intellectual Property Rights Acts and Data Governance laws.

Notes on the data

The data collection on DeepTech startups primarily covers funded startups with complementary desktop research of unfunded startups.

The database initially leverages Briter Intelligence 2.0 data, coupled with additional data collection to fill the gaps by identifying active DeepTech startups across the continent. The data effort revealed the presence of 329 active startups.

The data presented in the report does not claim to be 100% comprehensive or exhaustive. It offers a first scan of the DeepTech market in Africa, presenting both pure DeepTech solutions as well as startups typically associated with other industries, such as HealthTech, but that can be characterised as DeepTechs due to their products and services offered. Solutions without a strong digital presence are excluded from the mapping. The mapping and dashboard aim to present the most active DeepTech startups in the region who are contributing to shaping the DeepTech landscape in the continent.

Data can differ across different databases based on the taxonomy and methodology adopted. Briter's data in this study differentiates DeepTech startups between innovators and adopters (see annexure 1) and the analysis is restricted to startups categorised as "innovators"; also, newly founded startups are not included.

The DeepTech industry is continuously evolving and is gaining increasing momentum in Africa. The study is an invitation to contribute to strengthening the mapping of not only DeepTech startups in Africa but also other stakeholders active in the space such as investors, hubs, universities, and corporations.

1.1 Introducing DeepTech in Africa

Over the last decade, the innovation ecosystem in Africa has been on a growth trajectory, with African startups raising more than \$20bn over the period. Even with a fall in funding to startups globally over the last 18 months, the African startup ecosystem has shown more resilience. DeepTech has been one of the drivers of this resilience with breakthrough

technologies in cleantech, mobility biotech and health driving being the fastest-growing sectors in terms of funding over the last year.

However, DeepTech is at an inflection point. Momentum is growing around it, but many stakeholders active in the space including governments, investors and hubs are still lacking a full understanding of what DeepTech is in the regional context, its relevance for Africa, the people building DeepTech solutions, for which industries, and how they can contribute to socio-economic growth. Providing clarity on the definition of DeepTech in the African context, understanding the state of the ecosystem and identifying key gaps and opportunities are essential to unlock its potential and accelerate its growth.

1.2 Defining DeepTech in Africa

DeepTech is a fast-emerging field of innovation globally, however, questions have emerged about its relevance and applicability to the African context. To date, there is no standard definition of DeepTech in Africa. As part of the study, insights from stakeholders' engagement and desktop research are leveraged to offer a list of key characteristics of DeepTech in Africa. Below, definitions of DeepTech from different stakeholders are presented:

“A DeepTech startup is a company that’s focused on solving problems by integrating multiple advanced technologies. The product is rooted in science and engineering and often has a hardware component and goes through a testing and a feedback loop before moving to commercialisation. A DeepTech should be novel/new, disrupting an industry or the way something has been done before.” **Steven Vey, Entrepreneur in Residence, Savant**

“The distinction between true innovators and mere adopters in the DeepTech space often hinges on whether the data used is proprietary. Solutions based on unique, hard-to-replicate data are what constitute real DeepTech innovation. In contrast, using readily available data for basic applications, such as standard AI for credit scoring, does not qualify as DeepTech.” **Vianney Mathonnet, Partner, Modus Africa**

“In Africa, DeepTech might not only involve groundbreaking technology but also solutions that are deeply integrated with the social, economic, and environmental realities of the continent. For example, a DeepTech solution in Africa might focus on renewable energy technologies that are affordable and easy to maintain in rural or remote areas.” **Kate Hach, Head of Programme, Intel Ignite**

“DeepTech is a combination of scientific and engineering endeavours that come together to solve a real challenge that wasn’t really solvable before”. **Nick Allen, Managing Partner, Savant**

“The definition of DeepTech is only a question of the amount of the R&D required. When starting a business as a DeepTech, you cannot have a Proof of Concept after six months, you usually need 1 to 3 years to start having a real product or at least the beginning of a product. A big percentage of the staff is usually deployed in R&D. In the African context, the problem of DeepTech is that you are not able to raise because you don’t have a product, also, due to the very long cycles, you need sometimes more than two years between two fundraising rounds. This is what makes it a long tech. Also, by raising less due to the funding scarcity at the early stages in Africa, the amount of tech that an African DeepTech has is usually different compared to other DeepTechs developed in more advanced ecosystems”. **Vincent Sebag, Investor, Cathay Innovation**

“DeepTech are technologies based on significant scientific challenges offering groundbreaking solution advancements, typically requiring substantial R&D, usually complex requiring long development cycles but have a significant potential impact once developed”. **Moataz Kotb, Managing Director, Cultiv’Ventures.**

Based on these insights this report characterises DeepTech in Africa as follows:

- Fundamentally rooted in scientific discoveries or engineering breakthroughs that demonstrate significant advances over existing technologies and aim to solve the most important societal and environmental challenges in Africa.
- Have the power to fundamentally disrupt existing industries and create new markets.
- Require long R&D cycles before moving to market.
- Are unique, difficult to reproduce, and substitute.
- Are subject to a comparably high risk of technological feasibility since innovations in the respective context are completely new and have not yet been tested.
- Face high market risk due to their high degree of novelty. Since the technology is usually novel, the market may not yet be ready to accept it, meaning that commercialisation cannot always be guaranteed. However, if DeepTech works and is successfully commercialised, outsized returns can be generated.
- Capital intensive, requires a considerable amount of funding before commercialisation, is characterised by a long time to market and depends on several specific skills, expertise and infrastructure.

In sum, DeepTech in the African context can be defined as follows;

DeepTech in the African context are startups that are (1) using emerging base technologies in the fields of science and engineering to (2) design and deliver associated tangible products or industrial processes (3) that can be applied to specific use cases addressing complex and intractable problems, unique to the African market (4) across or within specific sectors of industries of the economy. These DeepTech startups are typically associated with long and uncertain R&D cycles, linked to higher-education institutions, typically in the STEM space and have optionality, meaning that they are not focused on only one problem, but rather are omni-use considering the widest set of problems.

1.2 Innovators versus adopters

The mapping exercise revealed two main groups associated with DeepTech, namely innovators and adopters. On the one hand, innovators refer to startups at the forefront of developing new technologies or significantly improving old ones, have foundational R&D and inject capital in it. Examples include FlyH2, a South African startup that designs and manufactures drones that can be used in agriculture and BixBio, a BioTechnology company working to unlock the potential of diverse genetic data in Africa to transform drug target discovery.

On the other hand, adopters use already existing technologies and apply them to improve their operations, services or products and serve the identified market needs while being cost-effective as they do not go through an R&D phase. Examples include fintech platforms using AI chatbots and virtual assistants to provide personalised advice and aid customers in making financial decisions. In the context of this study, the focus has been on Innovators only, as based on the above-suggested definition of DeepTech, R&D is a mandatory element. [Annexure 1](#) provides more clarity on the key differentiators between innovators and adopters. Throughout the study, innovators will be referred to as DeepTech startups.

1.3 Taxonomy of DeepTech Innovators in Africa

The innovators are broken down based on four key components that make up our DeepTech taxonomy: base technology, associated product, application use case, and industry. It is important to note that there is an overlap between categories for some products, such as drones. The table below provides clarity on the methodology used. Detailed examples for each category can be found in [Annexure 2](#).

Category	Description
Base Technology	Focuses on "how" something is done or "what" methods are used. These are the fundamental scientific and engineering principles that underpin each startup. They provide the foundation upon which other components are built. They are omni-use and at this stage, their core use case can be broad.
Associated Products	A mix of hardware and digital solutions showcasing the tangible manifestations of the base technologies and addressing particular needs or problems.
Application Use Case	This category illustrates how technologies address specific challenges in the African context, demonstrating their real-world applicability and adaptability.
Industry	Based on the primary industry that benefits from the technology, highlighting the diverse impact of deep tech across multiple industries. A majority of them can be applied to multiple industries.

1.4 Pathways to DeepTech Development

Startups in the DeepTech space build solutions using cutting-edge technologies to tackle real-world challenges. The research revealed that DeepTech innovations in Africa emerge through 3 main pathways:

1. *Innovations emerging from universities, also known as 'Spin-offs'*: Spin-offs refer to DeepTech startups that originated within a university, built primarily by student entrepreneurs and leverage university facilities and resources, such as labs. This is a common starting point for DeepTechs in the African context and is largely driven by the infrastructure and expertise provided by universities. Many solutions stem from research projects that are part of their academic curriculum. Two startups that were interviewed as part of this study, namely the Tunisian Cure Bionics and the Ethiopian Debo Engineering, both started at the university level.
2. *Innovations emerging from the ecosystem(ecosystem-driven innovations)*: This pathway includes DeepTech startups that a) are starting directly as startups by building the product from scratch or b)starting as an adopter and becoming an innovator, usually after raising funds and allocating resources into R&D to build a product. Another scenario that falls under the same archetype was noted by Moataz Kotb, Managing Director of Cultiv'Ventures, which entails startups launched by the

African diaspora that have worked in big corporations - usually in more developed ecosystems- and that have seen an innovation opportunity and taken it back home to the region by launching a DeepTech solution. These talents leverage their gained expertise and network to develop innovations, and can in some instances consider their former corporation as a potential partner, funder, or future acquirer.

3. *Corporate spin-outs*: Although less common, spin-outs refer to DeepTech startups coming out of big corporate research labs. The DeepTech startups in this case are usually linked to the parent company in terms of IP ownership.

In [Annexure 3](#), key differences between the three pathways are presented.

2. State of the African DeepTech Ecosystem

2.1 DeepTech in Africa Funding Landscape

2.1.1 Aggregate Overview

According to Briter Intelligence data, between 2013 and H1 2023, the mapped African DeepTech startups raised a total of \$3 Billion across 360 deals representing a 15% share of the total funding received by African startups over this period.

Between 2015 and 2023, a rise in terms of funding captured by DeepTechs in Africa is noticed as the total funding value went from \$86M in 2015 to \$1.2B in 2023. This is aligned with the global trend in DeepTech as according to BCG's report, DeepTech investments have significantly increased their share of venture funding claiming a stable 20% share of venture capital funding since 2019, which is a notable increase from just 10% a decade ago, signalling that these technologies have come into their own as an asset class³.

2021 was a record year for DeepTech in Africa in terms of the total volume of funding received as startups succeeded in raising a total of \$700M, defying the global VC downturn. In 2022, despite the 50% drop in terms of funding value, a rise in deal flow was noticed reflecting the rising interest in African DeepTech.

Looking at H1 2023, the funding value increased by more than 200% compared to 2022 value though with lower deal activity as a drop of 40% was noticed suggesting investors' shift towards larger-scale investments. This is reflected by InstaDeep's \$440 million acquisition and Zipline's \$330 million round contributing to a high funding value registered in 2023 to reach \$1.2Bn so far. This is in line with the global DeepTech scene as BCG reports that the size of the average DeepTech investment has significantly increased over the last years. Many investments now reach \$100 million or more, and billion-dollar funding commitments are no longer common.

Note: Inactive startups that raised substantial funding such as 54gene have been included in the analysis as they have contributed to shaping the African DeepTech ecosystem.

³ Boston Consulting Group, [An Investor Guide to Deep Tech](#), 2023

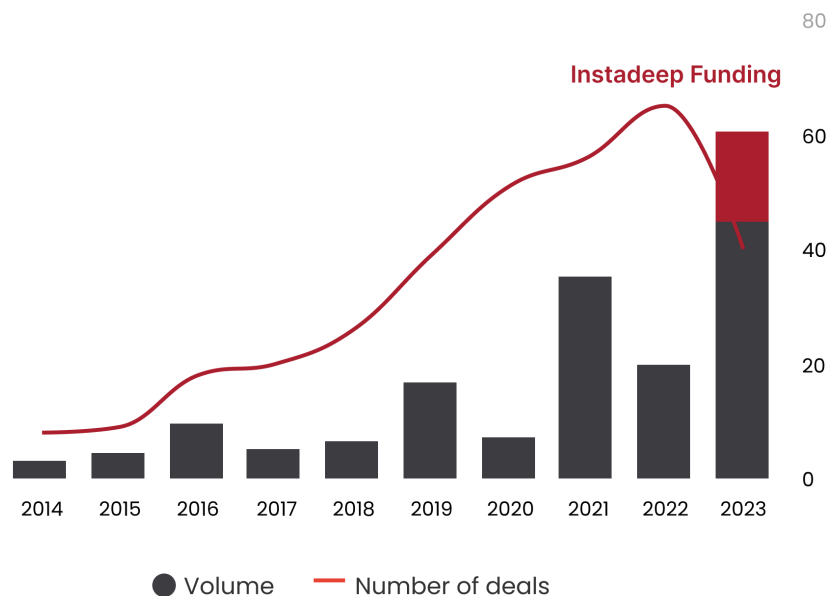


Figure 1: Funding evolution of DeepTech in Africa

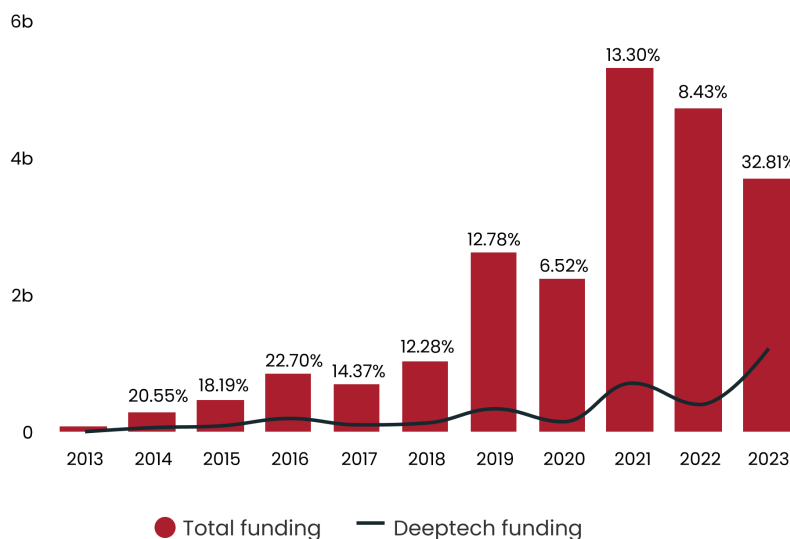


Figure 2: Share of funding into DeepTech in Africa

DeepTech is an inherently capital-intensive sector, and significant upfront capital is needed to create technically complex and costly hardware and software solutions. For startups in this space to build functioning products and scale, the availability of funding is essential.

2.1.2 Stages distribution

The majority of deals⁴ for DeepTech startups are at the early stages, with the incubator/accelerator stage accounting for nearly a third of all deals (33%), followed by Series A (19%) and Seed (16%). Funding at this stage is critical to support early ideation and R&D. Angel rounds, though representing a small portion (less than 2%), show potential to offer entry-level capital to startups.

The data reveals a funding gap at later stage funding highlighting the challenge that DeepTech startups face in terms of access to funding both at the early and late stages of their journey. The current DeepTech exit market is also small, which can in part explain the reluctance of early-stage investors to invest in the space as there are currently limited pathways to see a return on investment.

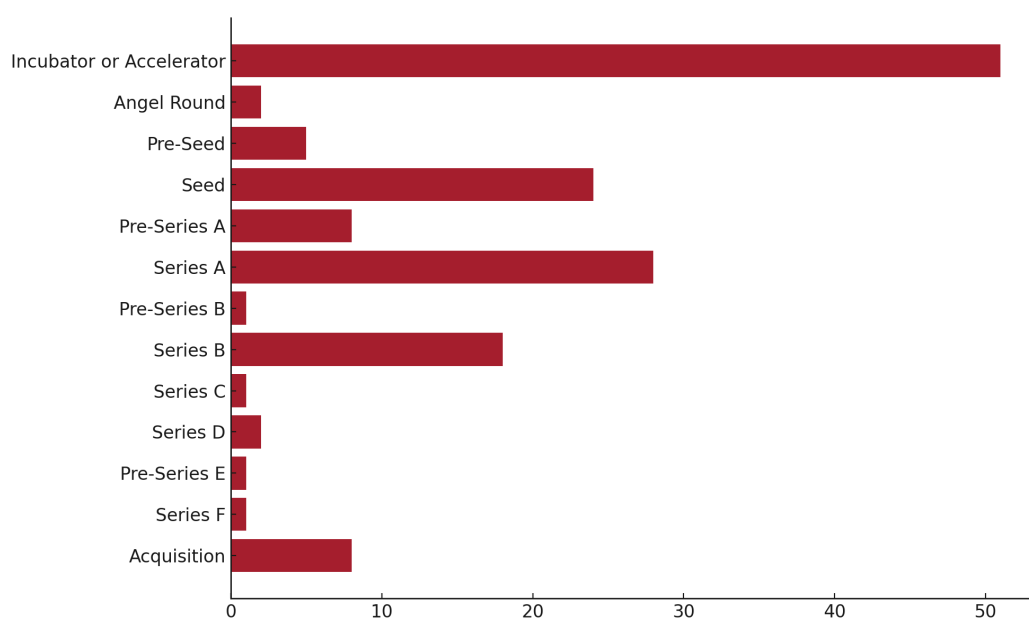


Figure 3: Funding breakdown by funding stage

⁴ 61% of the deal stages were unspecified.

2.1.3 Funding Instruments Distribution

Equity is by far the top funding instrument adopted when investing in DeepTech in the region both in terms of volume of funding (67%) and number of deals (63%). Interesting deal activity is noticed through grants and awards accounting for 16% of the deals though with much smaller volumes constituting less than 1% of the total. The usage of these instruments reflects their key role in supporting DeepTech startups at the early stage.

In line with the African VC trend in the last few years, an increased usage of debt as a funding instrument is noticed. Between 2014 and H1 2023, disclosed volumes of \$2.1 Billion+ have been channelled to more than 150 companies, across more than 200 deals in Africa according to Briter Intelligence data. For DeepTech, the data shows debt as one of the funding instruments used when investing with larger tickets in DeepTech in Africa (18% in terms of volume of funding) though with a lower frequency of deals compared to grants for instance (11%).

On the later-stage end, the high value but low frequency of acquisition deals, 13.2% in terms of the volume of deals but only 2.5% in terms of the number of deals, highlights both their scarcity and their impact. Each acquisition deal represents a substantial investment, indicating major strategic moves within the industry. It is worth noting that interviews revealed the need for more patient capital for DeepTechs to adjust to their unique lifecycle. Whether investing through equity or debt, funders investing in DeepTech should be adopting a strategy where sustainable growth is prioritised over financial returns.

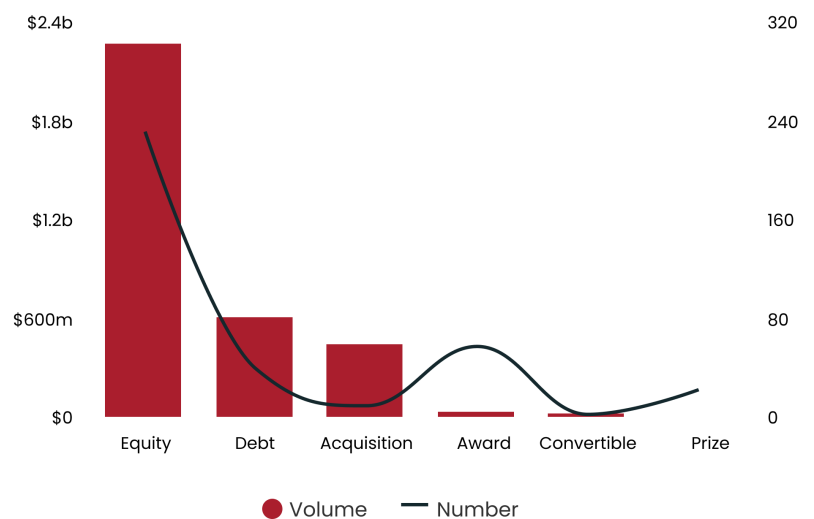


Figure 4: Funding distribution by funding Instrument

2.2 DeepTech Stakeholder Overview

Exploring the state of DeepTech in Africa requires identifying key stakeholders active in the space and understanding the role and contribution of each in strengthening and driving the ecosystem. Since DeepTech has been revealed as a complex field, a multi-stakeholder approach is needed to drive its growth in the region. Providing clarity on the existent regional ecosystem landscape can be a good first step towards catalysing synergies between the different actors in the space.

Based on the mapping exercise and the engagement held through KIIIs, stakeholders can be categorised into 6 main groups, namely: 1) startups, 2) investors, 3) hubs, 4) corporates, 5) universities and 6) governments. This study identified more than 900 active stakeholders across the different groups operating across Africa. In this section, a mapping and an analysis of the DeepTech ecosystem stakeholders will be presented.

2.2.2 Startups

2.2.2.1 Mapping DeepTech Startups in Africa

A mapping exercise of the existing landscape revealed the presence of 300+ DeepTech startups across the region. In the following section, the top products, industry applications, geographical distribution, and demographic breakdown are explored.

AFRICA'S DEEPTech STARTUP LANDSCAPE

300+

Health & Biotech
example include in drug discovery and diagnostics

Mobility
example includes in battery technology for electric vehicles

Software
example includes in data analytics for business intelligence

Agriculture
example includes for drones in precision agriculture

Omni-Use
can be applied across most industries

Utilities
example includes in smart grids to make more efficient

Manufacturing
example includes in advanced robotics for automation

Security
example includes in threat detection response systems



*only select companies based on amount of funding raised have been included. This map does not claim to be comprehensive

Figure 5: Africa's DeepTech Startup Landscape

Case Study: Intella, Pioneering Real-Time Data Intelligence in the MENA Region

Founded in 2021 by Nour Taher and Omar Mansour, Intella is a DeepTech company focused on delivering real-time intelligence to businesses in multiple forms including real-time market research, multi-dialect Arabic voice transcription, and chatbots.

Intella uses advanced technologies like AI and machine learning to provide various services. These services include 1) consumer research using surveys, polls and quizzes, 2) focused research using in-depth interviews and focus groups, 3) Intella chat, a one-stop system that connects parties instantly with their customers in a seamless way, and 4) Intella Voice, which transforms data from speech into insights using AI. Intella's use of advanced technologies in products like Intella Voice has showcased a 95.73% accuracy rate in Arabic dialect transcription.

To date, Intella has cumulatively raised \$3.4 million from investors such as HALA Ventures and Wa'ed Ventures, the venture arm of Aramco.

Some of Intella's achievements include winning 1st place in Huawei's startup competition, leading to a mention as one of the 5 global success stories in Huawei's 2023 cloud summit. Intella also won 1st place in the Startup World Cup competition and headed to Silicon Valley in December 2023 to compete in the grand finale.

Case Study: Debo Engineering, The Ethiopian DeepTech building Early-Crop Disease Detection Solutions

Founded in 2018, Debo Engineering is an integrated engineering innovator in Ethiopia, specialising in emerging technologies like Artificial Intelligence, Data Science, IoT, VR, Big Data analysis, mobile computing, and other related fields. They design, develop, test, implement, and evaluate innovative and efficient SmartTech services and products in various sectors including agriculture, health, education, tourism, transportation, and construction. They also offer services such as website and application development for desktop and mobile, network and electrical installation, as well as graphics and multimedia.

Debo Engineering originated from Jimmi University and was established by two engineers, Jermia Bayisa (CEO with qualifications in Computer Science, Civil Engineering, computer networking, and project management and finance), and Boaz Berhanu (CTO with a background in Electrical and Computer Engineering, and Computer Engineering). The university provided them with a centre, community support, and resource access to develop the technology.

Despite their diverse sector involvement, Debo Engineering prioritises agriculture and has a flagship solution, an 'Early Crop Disease Detection, Monitoring, and Prevention' app. This solution has gained both national and international recognition for increasing productivity by detecting crop diseases early, thus boosting crop yield.

In the past three years, Debo Engineering has participated in various national and international contests, achieving significant recognition. They were acknowledged as one of the most digitally innovative projects at the World Summit Award (WSA 2020), won the Community Choice at the MEST Africa Challenge 2020, and were top competitors at the African Innovation Week 2020. Additionally, they participated in the AI African Workshop by the Jimma Institute of Technology, won the Coffee Innovation Fund 2021 (sponsored by BMZ of Germany/GIZ), were selected in the top 30 for the Zayed Sustainable Prize 2020, and recognised as one of the top 50 impactful African startups in 2020, representing Ethiopia at the WSA 2020. Their Early Crop Disease Detection, Monitoring, and Prevention App was also acclaimed as the most outstanding digital innovation in Ethiopia, showcased at the 1st National AI Workshop and Expo, and received accolades from the Prime Minister of Ethiopia. They also won the Excelling and Historical Innovation Award at the HEART Convention 2021.

Despite its success, Debo Engineering faces typical challenges such as limited funding, limited support networks, market limitations and a need for stronger partnerships that are faced by startups in developing countries. Nonetheless, their proactive approach and commitment to excellence suggest promising future growth.

2.2.2.2 The Technologies

Artificial Intelligence (AI) and the Internet of Things (IoT) have been revealed as the leading technologies used by DeepTech startups across the continent and are attracting the largest share of funding, represented by Instadeep, Sama, Instabug and Zipline. A range of other technologies such as Blockchain and 3D Printing are gaining traction. These technologies are then applied to develop DeepTech products such as drones, smart solar systems and big data and analytics solutions.

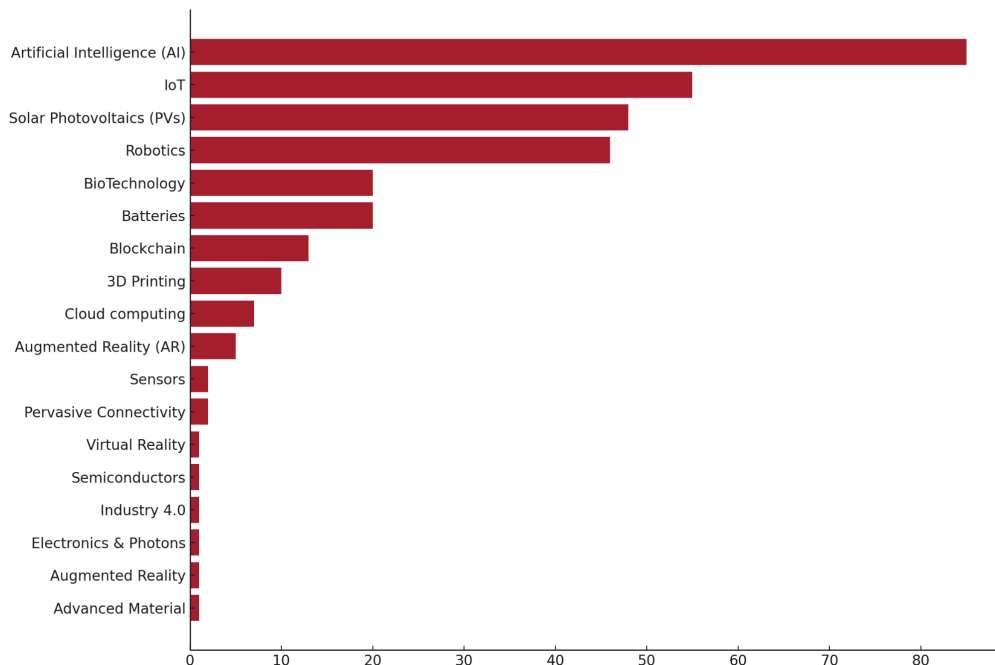


Figure 6: Technologies usage distribution by African DeepTech startups

2.2.2.3 Top DeepTech Products

An almost equal distribution can be seen in terms of the underlying structure of the DeepTech products as 36% of the mapped innovations are hardware, 36% are a mix of hardware and software, and 28% are software only with no hardware component. The predominance of hardware products can be attributed to the fundamental nature of deep technology as it often involves tangible, physical innovations. For DeepTech startups using technologies such as robotics, IoT, and advanced manufacturing, having a hardware component becomes a necessity. Examples of software-only products include advances AI algorithms used in big data and analytics platform for business intelligence. On the other hand, combined hardware-software products include autonomous drones that integrate sensors with AI-driven navigation systems, or wearables devices that pair biometric monitoring hardware with AI data analysis for personalised health insights.

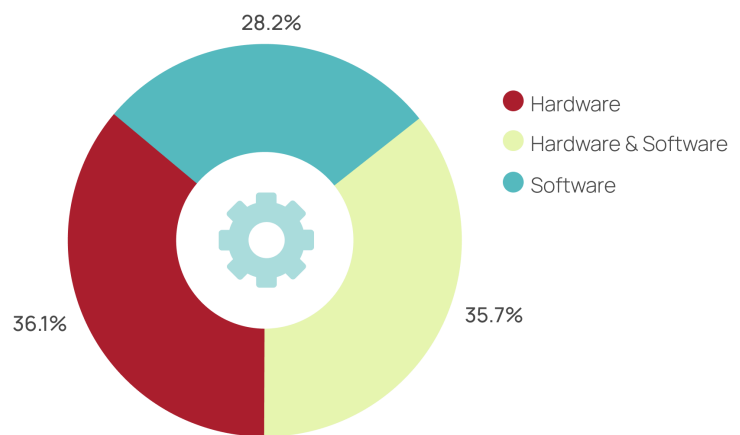


Figure 7: Product Distribution

2.2.2.4 Industry Application

The mapping revealed diversity in terms of industries where DeepTech is being applied across the region. Top industries include renewables and cleantech, health & biotech, and agriculture, among others. In terms of numbers, innovations in the renewables and cleantech industry are the highest representing 20% of the total mapped innovations, followed by health and biotech (17%) and agriculture (8.5%). Funding distribution across industry applications follows a similar trend to the number of solutions mapped with Cleantech & Renewables, Health & Biotech, and Agriculture & AgTech leading both in terms of the number of deals and total volume of funding received. Cleantech and solar solutions captured the largest share of funding (almost 46%) of the total, health and biotech solutions and agriculture and agtech solutions attracted 27.4% and 4% respectively of the total funding value in the same timeframe.

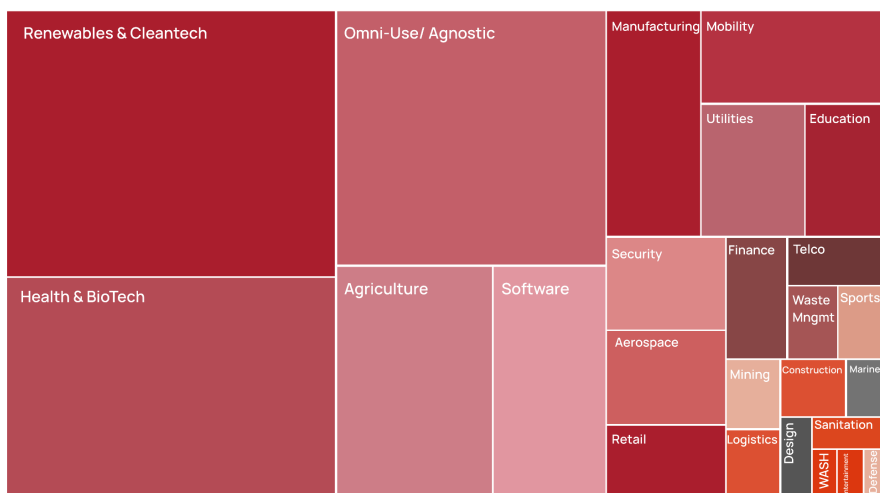


Figure 8: Industry breakdown

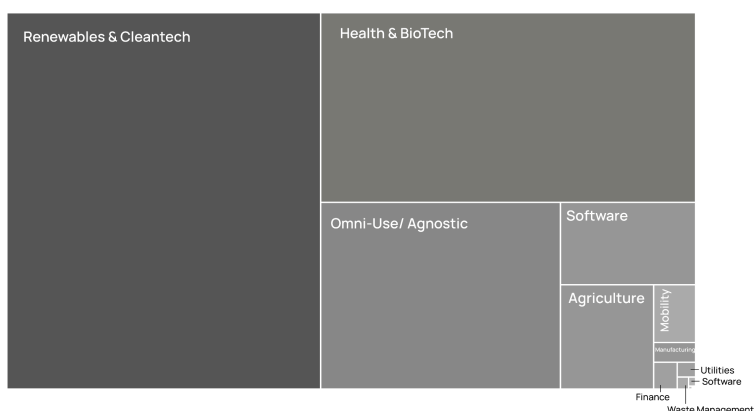


Figure 9: Product funding by volume

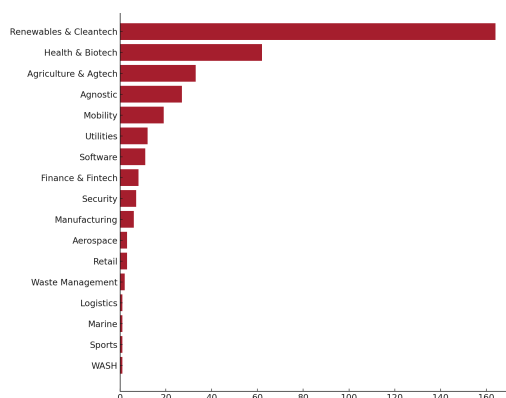


Figure 10: Product Funding by no. of deals

A presence of innovations applied to the Software and Manufacturing industries is also noticed reflecting the ongoing digital transformation efforts in Africa. It is also worth noting that some DeepTech products can be omni-use (16.5%), meaning can be applied in a multitude of contexts and industries. For example, IoT, robotics and drones can be omni-use, and their applications can span different industries for example in logistics (warehousing), health (medical delivery) and agriculture (precision farming). Another example is Big Data and Analytics - with AI being the underlying technology - which can be applied in any industry for business intelligence.

Based on the engagement with investors active in the DeepTech space, health and agriculture were highlighted as the industries where investors see a lot of potential. Below, we take a deep dive into four of the top use cases for DeepTech applications.

Agriculture

One of the primary applications of DeepTech in agriculture is in precision farming, which uses advanced sensors, satellites and drones, as well as big data and analytics to optimise crop yields and reduce resource usage. Startups in this industry utilise DeepTech to build products that help farmers monitor and adjust variables such as soil conditions, moisture levels, and weather patterns, allowing for more efficient and sustainable farming practices. Burkina Faso's Cargitech Sarl for instance develops robots specialised in cartography that help farmers in topography, aerial mapping and geographical information systems. Ethiopia's Debo Engineering, Côte d'Ivoire's WeFly Agri and Morocco's SowIt develop drones to be used in agriculture.

The sector also benefits from automation using robots. From autonomous tractors to robotic harvesters, these technologies are helping address labour shortages and improve operational efficiency. Moreover, with the integration of AI, these systems are becoming smarter, and capable of making data-driven decisions that further enhance productivity and cost-effectiveness. South Africa's Arci is an example of this.

Health

Vianney Mathonnet, Partner at Modus Africa says: *"The health sector in Africa is experiencing significant innovation in DeepTech. This is partly due to the unique context of Africa, where there's less resistance to sharing health data compared to regions like Europe or the U.S. He adds: "The limited healthcare access and the smaller insured population in Africa facilitate the adoption and development of health tech solutions, potentially positioning Africa as an exporter in this field".* The growth of DeepTech in the health industry

indicates a focus of African startups on advancing medical research, pharmaceuticals, and healthcare technologies, which are critical in addressing the evolving regional health challenges.

One impactful application area of DeepTech is in personalised medicine, where AI and machine learning algorithms analyse vast amounts of genetic and clinical data to develop tailored treatment plans. This approach allows for more effective therapies, taking into account individual genetic makeup and reducing the one-size-fits-all approach to treatment. South Africa's BixBio and Biotech Laboratories are examples of startups that utilise biotechnology for drug and medicine discovery. Health management and electronic medical records are increasingly using AI to store patient medical history and records. Other application use cases of DeepTech in health include drones for medical delivery (Zipline), and making smart devices, wearables and prosthetics (HearX in automation of surgical procedures using robots).

Logistics

Another industry where growth in DeepTech innovations is being noticed is logistics. Vianney Mathonnet points out the potential for innovation in the logistics sector for Africa, particularly in drone technology and the transportation of goods. He suggests: *"Despite the challenges posed by Africa's reliance on traditional infrastructure like roads and railways, there's significant growth potential in this area"*. The main hurdle, as identified by Vianney, is the funding, especially for hardware aspects of mobility projects as solutions of this nature require large upfront funding and ongoing investments to build functional products. Yet, this type of funding is difficult to come by without a tried and tested model and a demonstrated market to scale in.

The main application use case of DeepTech in this industry is in drones for delivery. Examples of startups innovating in this space include Kenya's Swift Labs and Nigeria's Arone. The integration of the Internet of Things (IoT) is also revolutionising logistics. Sensors and IoT devices are being used for real-time tracking of goods, providing precise location data and condition monitoring (such as temperature or humidity) of sensitive products. This capability is particularly vital in transporting pharmaceuticals and food, where maintaining product integrity is crucial.

Cleantech and renewables

About 70 startups operate in the Cleantech and Renewables space. As noted earlier, the classification of renewables and solar energy solutions as DeepTech solutions is somewhat

contested. While some stakeholders consider them DeepTechs as they offer a technology solving a real challenge and usually have a product with a hardware element, others exclude them, arguing that the technology does not go through a continuous development process. Common considerations for the inclusion of Cleantech and Renewables can be found in [Annexure 4](#). Many solar energy companies offer installation rather than the development of the actual hardware, however, this is not always easy to differentiate. In this context, Moataz Kotb, Managing Director at Cultiv'Ventures says: *"Renewable and solar energy solutions can only be considered DeepTechs if they are constantly looking to improve their technology and thus have a perpetual R&D"*. This study considers CleanTech to be relevant due to the rate at which these solutions are emerging, the technological complexity, continuous advancements, and the impact held in the African context in providing access to energy.

For its direct application use case, we see AI and IoT being used to enhance the performance of solar panels. These technologies can predict and optimise energy output, monitor panel health, and even adjust panel angles in real-time to maximise energy absorption. Similarly, in wind energy, DeepTech is being employed to optimise turbine performance, predict maintenance needs, and increase overall efficiency through sophisticated data analysis. Battery technology and energy storage are also benefiting from DeepTech enabling smarter management and storage of energy. Examples of startups include South Africa's RenewCo and Boost Mechanics, both incubated by Savant.

2.2.2.5 Geographical Distribution

In terms of geographic distribution across the region, South Africa holds the highest concentration of DeepTech startups in terms of numbers. South Africa's dominance (90+ startups) can in part be explained by the country's robust and established innovation ecosystem coupled with its strong university system and the national government's support to R&D, mainly through the Technology Innovation Agency and the National Intellectual Property Management Office (NIPMO) for IP-related advisory. Revel Veyer, Director of CPU's University's Technology Transfer notes that *"93% of South Africa's publicly funded R&D portfolio is in DeepTech, as opposed to IT and fintech. This indicates a strong emphasis on DeepTech, especially in areas like health, drug discovery and medical devices. An example is the significant R&D in the health sector, accounting for a quarter of all publicly funded research"*. Looking at the funding distribution across the region, South Africa holds the second position in terms of number of deals with a 21% share following the leading market Kenya which captures 25% of the total number of deals largely driven by investments in the solar sector in Kenya. Funding distribution in terms of volume funding between 2013 and 2023 puts South Africa in a different position. While Kenya remains leading with a 32% share, only

5% went to South African DeepTechs reflecting the small ticket size going to early-stage startups in the market.

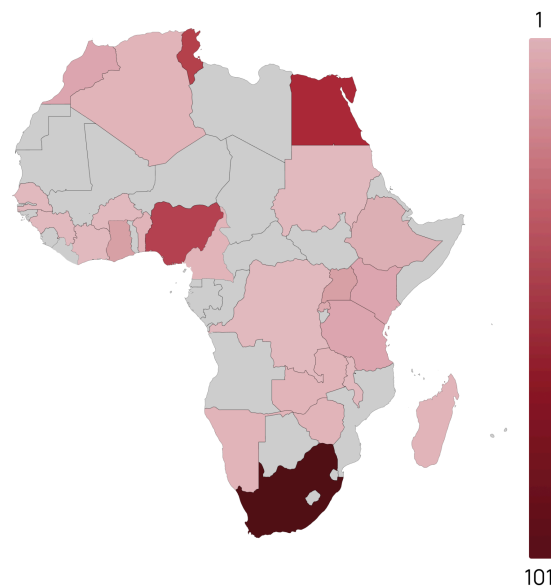


Figure 11: Geographic distribution of startups across Africa

Egypt and Tunisia follow South Africa in terms of the number of active DeepTech startups, with 45+ and 40+ each, and are locations that are increasingly identified as DeepTech hubs, benefitting from strong local ecosystems where different stakeholders are driving DeepTech innovation locally. The quality of the education and university system in a specific country also goes hand in hand with the quantity and quality of DeepTech startups emerging from it. Nick Allen, Managing Partner at Savant says: “*Where education is strong, DeepTech innovations are the strongest*”. It is worth noting that a bigger pipeline of DeepTechs does not necessarily mirror the general funding trends. For instance, Tunisia is not identified as one of the markets with the highest deal activity in terms of number of deals despite being ranked as the 2nd country in terms of the number of startups. Less than 4% of the deals went to Tunisian DeepTechs highlighting the diminished engagement of active investors in the market despite the presence of a pipeline. Tunisia's share of funding however shows a slightly different story as 16% of the total volume of funding received by DeepTechs in Africa between 2013 and 2023 was captured by Tunisian startups, though largely driven by InstaDeep.

Kenya and Nigeria on the other hand have emerging DeepTech ecosystems. This is partly driven by the significant number of renewables & cleantech companies present locally. Excluding deals in renewables and cleantech shows a drastic drop in funding as illustrated in Figure 8. Interestingly, despite a 3% share in terms of number deals, Rwanda emerged as the second most funded ecosystem capturing 24% of the total volume of funding received by African DeepTechs between 2013 and 2023 largely driven by Zipline and Ampersand deals putting Rwanda on the map.

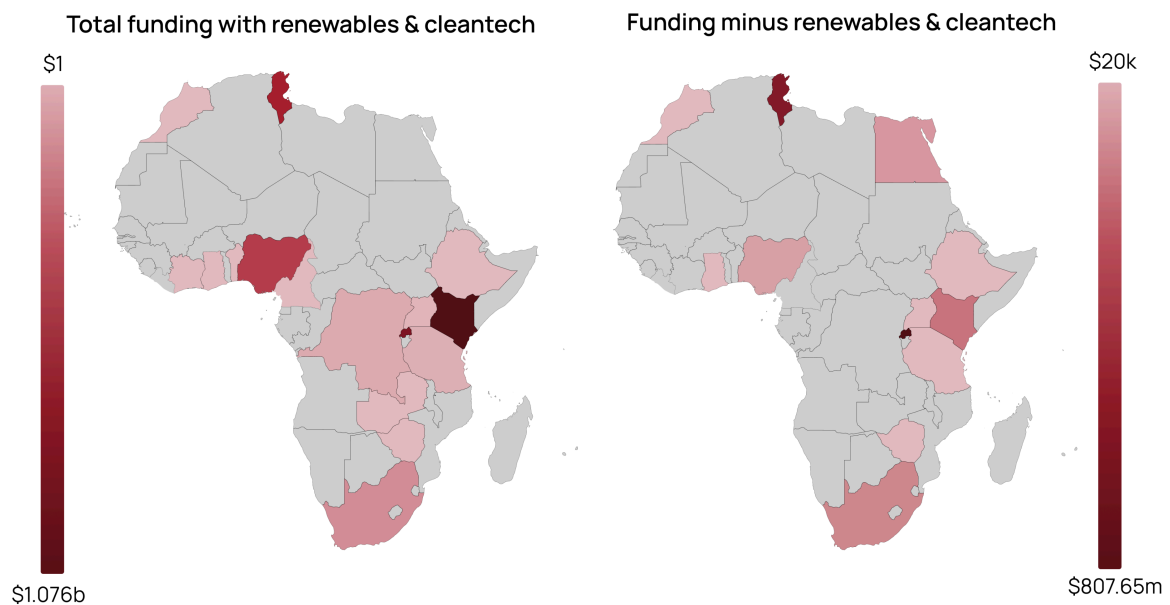


Figure 12: Funding distribution by geography

Out of the 300 mapped startups, 20% are incorporated outside of Africa and 80% have headquarters (HQs) in Africa. The data indicates that DeepTech startups with HQs abroad have been more successful in attracting funding, as 81% of them had access to capital, however, only 56% of DeepTech startups with HQs in Africa succeeded in raising funding. This is a trend more broadly noted across the innovation ecosystem in Africa, in the sense that many investors consider domiciliation and the existence of financial centres to ensure ease of repatriation and exits for financial returns.

2.2.2.6 A Look at the Founders

Demographic Breakdown

Almost 90% of the mapped startups are all-male-led while only 13.5% have at least a female on the founding team, revealing low participation of women in the DeepTech ecosystem in

Africa. This is not specific to DeepTech as only 24 % of funded African startups have at least one female founder. In comparison, 88% of the funded DeepTech startups are all-male-led and only 12% have at least one female co-founder. This follows broader trends often observed in the entrepreneurial and tech sectors regionally and globally, where all male-founded startups often capture the lion's share of investments.

Artificial Intelligence (AI) and Solar Photovoltaics (PVs) emerge as the top technologies developed by female-led DeepTech ventures compared to more limited participation in technologies such as advanced material, Augmented Reality, Cloud Computing, and Semiconductors.

In terms of industries, the data reveals that male-led DeepTechs operate across various industries and that female-led and mixed-team DeepTechs are building solutions mainly applied to health & biotech and renewables & cleantech industries. Additionally, comparatively lower activity in traditional Industries such as mining, marine, and utilities is noticed for women-led ventures. Opportunities in agriculture and education industries on the other hand, though with smaller numbers, show the presence of women co-founders. These are industries where solutions can potentially have a high impact, given their societal importance.

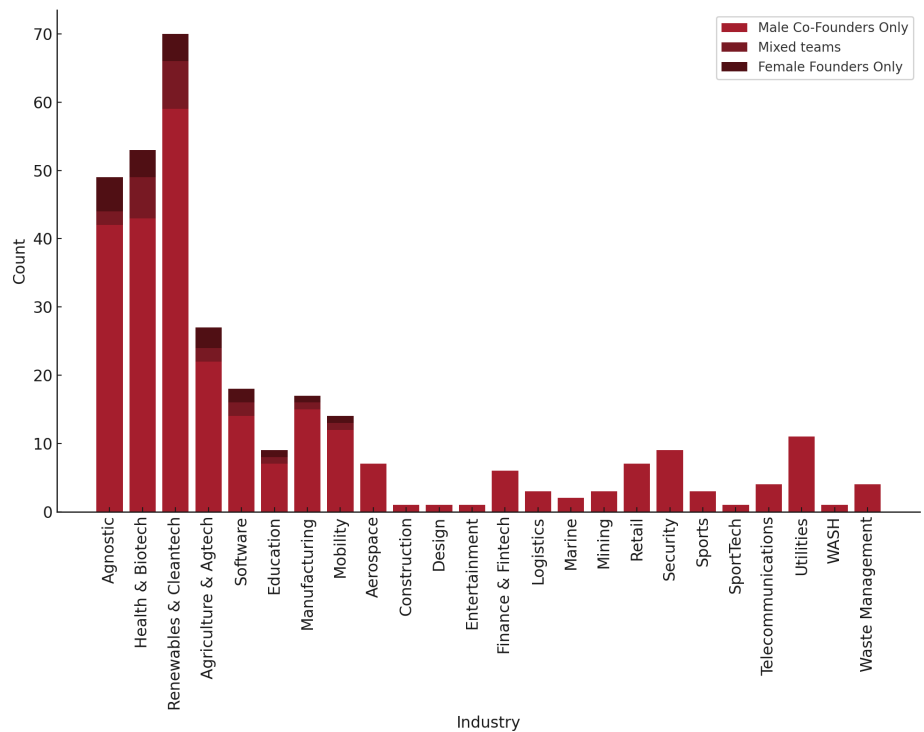


Figure 13: Distribution of startups by industries and founder gender

Educational background

There is also an important link to be made to the level of education needed to build a DeepTech. The data shows that the founding teams behind the funded ventures mapped in this study usually have a strong educational background, with the majority of 35% possessing a master's degree as their highest level of education, 30% with a bachelor's degree, 16% holding an MBA, and 11% with a PhD⁵. Additionally, 60% of the mapped founders have pursued studies abroad, while 40% went through local universities.

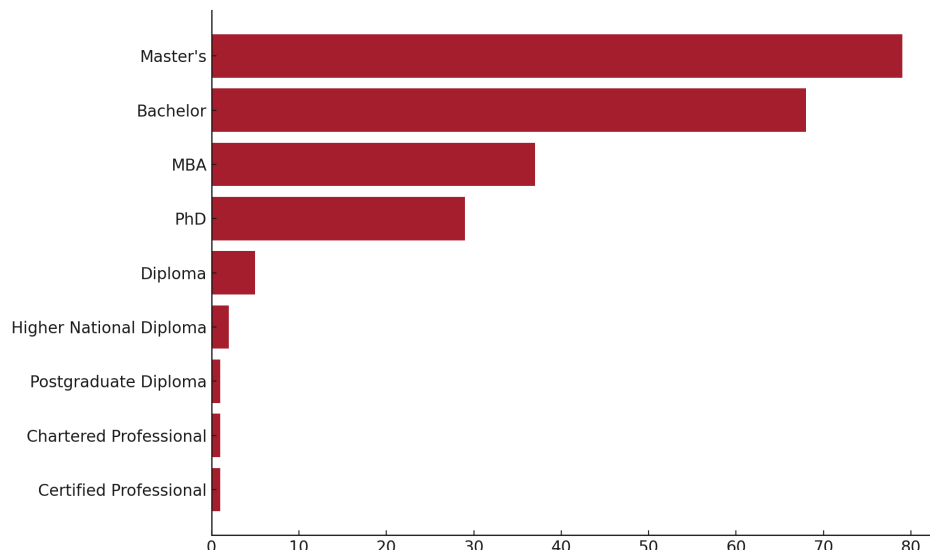


Figure 14: Educational background of DeepTech startups

In terms of university curriculums, the data shows that the majority of DeepTech founders (23%) accessed an engineering degree, and 8% followed studies in computer science and software engineering. These technical skills are directly related to the scientific and technical aspects required to build and constitute a DeepTech solution. However, a lack of business acumen among many founders has been flagged as a gap by investors during the KIIs, Revel Veyer from CPUT, Kate Hach from Intel Ignite and Nick Allen from Savant all

⁵

highlight the lack of entrepreneurial skills among tech startups. This gap usually hinders the scaling of their innovations and their entry into the market.

2.1.3 Investors

2.2.3.1 Mapping DeepTech investors in Africa

More than 300 identified private-sector investors provide a crucial source of capital for DeepTech startups. Aside from access to capital, investors active in this space often provide startups with additional support services, such as access to expertise, and access to partners and market.

Out of the investors investing one or more funding rounds into DeepTech, 65% are Africa-based and 35% are global investors. In terms of typology, venture capital (VC) firms appear as the most active investors representing 52% of the total mapped investors, followed by impact investors (13%), investment firms(8%) and angel investors (8%).

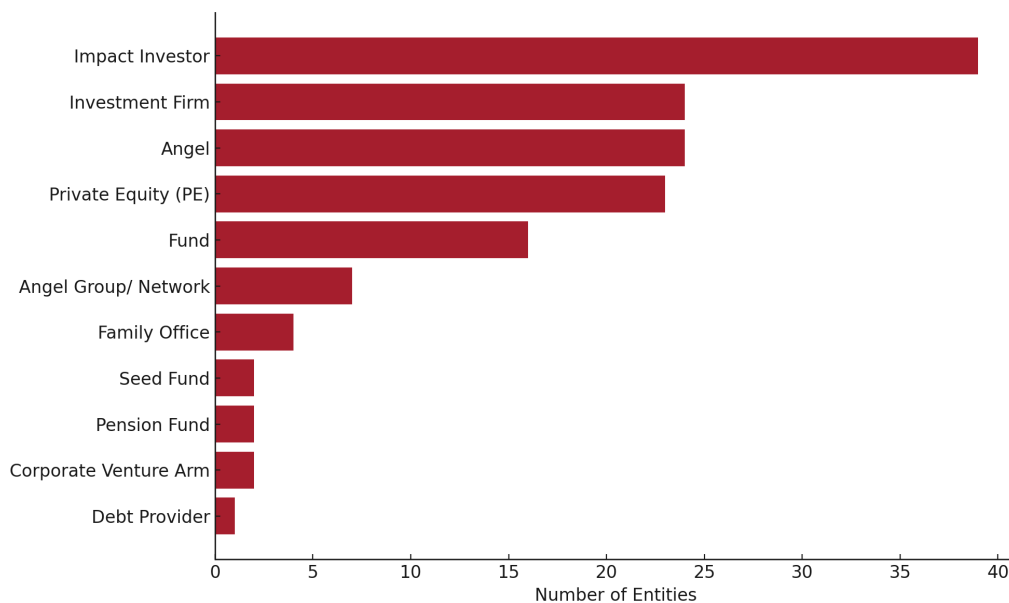


Figure 15: Active investors distribution by type

2.2.3.2 Investment distribution by investor type

Despite the uniqueness of DeepTech investment in terms of due diligence and performance indicators, data shows that only 4% of the mapped investors have a DeepTech-focused mandate, while the other 96% are either sector-agnostic or focus on other industries. The latter is likely to have a diverse portfolio and may have invested in the DeepTech startups as part of a wider strategy. As presented previously, DeepTech can cut across multiple industries, for example, investors with an interest or mandate to invest in Agtech or Healthtech can consider investing in DeepTech startups but wouldn't necessarily have the proper mechanisms in place to provide DeepTechs with the needed support adapted to their unique product lifecycle. The benefit of these investors is that they have more targeted expertise for the use cases and applications for different industries where DeepTech is being applied.

DeepTech-focused investors on the other hand, although representing a small portion of the total mapped investors (4%), represent a niche group of investors with a solid understanding of DeepTech specificities and the right strategy in place to support them. These investors are more likely to bring specialised expertise and relevant networks and have a deeper understanding of the challenges and opportunities specific to DeepTech. DeepTech-focused investors, such as SAVANT in South Africa, have adjusted their strategy and due diligence to align with the specific needs of DeepTech innovations. This includes the performance indicators they look at when evaluating opportunities and unlocking specific support, such as connecting startups to corporations to access infrastructure or providing support to refine their go-to-market strategy. Another example is Ambo Ventures, investing at the R&D stage and setting post-commercialisation milestones with the startup they invest in. As part of their strategy, Ambo supports startups planning the commercialisation of their product, provides support on the IP and helps them connect with commercialisation partners to licence their DeepTech.

The table below presents 13 identified DeepTech-focused investors or funds active in Africa.

Investor	HQ Country	Foundation Year	Description
Aera VC	Singapore	2017	Aera VC is an early-growth fund that invests in deep tech ventures that accelerate the world towards a more sustainable future.
Alphawave	South Africa	2017	Alphawave is a South African technology

			investment group whose portfolio companies are in the fields of web 3.0, artificial intelligence, space tech, agri tech, and virtual reality.
Ambo Ventures	Morocco	2020	Ambo Ventures is a Venture Capital that invests in impact-driven and socially responsible startups with an emphasis of hardware-based solutions in the climate space. Their portfolio ranges from smart hardware to biotech.
Cathay Innovation through Africinvest	Tunis	1994	Cathay AfricInvest is a fund that invests in early to growth-stage startups based in or focused on Africa that are ready to scale and make a significant impact. It has invested in many DeepTech startups including Instadeep
Cultiv'Ventures	Egypt	2019	Cultiv Ventures is a \$10M seed-stage fund to back deep-tech & electronics design start-ups, leveraging the partners' network within the industry.
HAX	USA	2012	HAX, a program built for pre-seed startups solving hard problems with hard tech is a part of SOSV, a global venture capital firm providing multi-stage investment to support deep tech founders.
Modus Africa	USA	2016	Modus Africa is an impact-focused venture capital fund that targets early-stage startups in Sub-Saharan Africa that are powered by AI and blockchain.
Nemesis Technologies	Japan	2022	Nemesis Technologies is a venture capital investment firm based in Tokyo that invests in seed-stage, early-stage, and later-stage companies operating in cleantech, climate tech, cybersecurity, life sciences, and robotics.
Savant	South Africa	2004	Savant invests in African hardware and deep technology companies that are

			underpinned by science and engineering innovations. It has an incubator, a seed fund and a seed+ fund
Sequence Ventures	Egypt	2020	Sequence Ventures is an early-stage venture capital firm focused on investing in young entrepreneurs building promising startups with an opportunity to scale. It has an Egyptian Deep Tech fund focused on acquiring companies operating in a range of tech sectors, including health tech, fintech, edtech, proptech, logistics, and DevOps.
UM6P Ventures	Morocco	2019	UM6P Ventures provides Deeptech Ventures with capital and advanced talent sourcing, subject domain expertise, and the ability to access specialised equipment and infrastructure. UM6P Ventures has actively invested in Agrobioscience, Biomedicine, Water and energy, Artificial Intelligence (AI) and cybersecurity.

While some investors have been active in the space early on, such as Savant in South Africa, a surge in the number of DeepTech-focused investors can be noticed since the late 2010s. Funds such as Cultiv'Ventures (2019), Sequence Ventures (2020), and Nemesis Technologies (2022), were founded in the last decade, indicating a recent surge in interest in DeepTech solutions in Africa. This growth mirrors global technological advancements and increasing global interest in sectors like AI, IoT, and biotechnology, which may have contributed to rising the interest of active investors in DeepTech solutions specifically.

2.2.3.3 Investment distribution by stage

Most of the investors (77%) invest at the early stage, including funding rounds from pre-seed to Series A. The remaining 23% was invested at the growth and later stage, from Series B+, revealing a gap in terms of access to late-stage capital for DeepTech startups. VCs show the highest activity across all stages of funding and can be considered the drivers of

early-stage investment for DeepTech startups along with impact funds, preparing the ground for late-stage investors. VCs also appear as the top investors at a later stage. Although active at the early stage, the participation of angel investors and business angel networks is relatively small in the DeepTech space but could play an important role in supporting the R&D phase for DeepTechs to lead them to institutional investors.

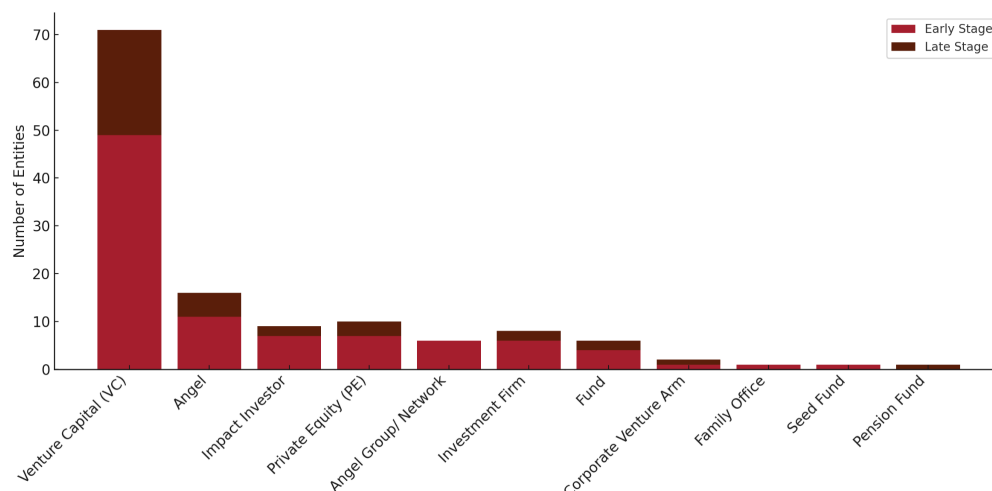


Figure 16: Specified Investment stage breakdown by investor type

Case Study: Modus Africa: Investing in African AI & Blockchain Innovations

Modus Africa serves as the African Venture Capital division of Modus Capital, a global VC platform backed by USAID, Mubadala and The Rockefeller Foundation with strong exposure to the Middle East, Africa, and North America. Modus Africa invests in early-stage startups whose main impact is focused on Africa. This includes both Sub-Saharan startups and MENA-based startups solving massive problems in Africa or those that are looking to scale to the continent. Modus Africa is sector-agnostic but targets innovations powered by AI and Blockchain technologies.

Modus Africa's motivations to invest in Africa include a) its acknowledgement of Africa as the continent experiencing the fastest growth, b) its understanding that investing in technology is crucial for transitioning Africa into the 4th Industrial Revolution, especially noting that startups employing artificial intelligence could potentially double a country's GDP growth by 2030 and c) the attractive valuations of DeepTech startups in Africa, presenting opportunities to invest in reputable companies at reasonable valuations. This approach sets the stage for potential Unicorn and Zebra exits and stimulates foreign investment into the continent.

Modus Africa's initial investments are in the early-stage startups (seed +), focusing on the founders and executive team, traction, and scalable business models from a unit economics perspective. Modus also provide follow-on investments to the startups that have demonstrated strong traction and impact. Initial investments are from \$350k to \$1.2m, with follow-on investments up to \$2M. In addition to capital, Modus Africa supports its portfolio startups in different ways to fill in any gaps that they may be facing as their businesses continue to grow.

Some of these operational areas of support include:

- **Product side:** Supports all aspects of research, design and product development.
- **In strategy and growth:** Assisting in user acquisition, business modelling, building the go-to-market strategy and supporting the growth.
- **Talent sourcing and placement:** Helping in identifying HR needs, funnel building and screening suitable candidates.
- **Investment readiness:** Supporting in valuation, financial modelling, and introduction to Modus Africa's investors network for potential follow-on funding.
- **Network:** Facilitating startups' introduction to industry experts and investors based on their needs.

To date, Modus Africa has supported various startups across the region including Egyptian Fintechs Ingiz and Purpl.

2.2.4 Hubs

2.2.4.1 Mapping DeepTech Hubs in Africa

The mapping exercise revealed the presence of 127 hubs active in the DeepTech space across the region, either through incubating/accelerating one or more DeepTech ventures or having programmes targeted to Deep Technologies.

Hubs represent a support system for DeepTech innovations to foster their early-stage development. Hubs include venture builders, incubators and accelerators. Hub programmes typically provide services such as training, mentorship, business advisory, coworking facilities, access to expertise, and access to networks. Some hubs also provide access to capital through grants or equity. These are all crucial skills and resources DeepTech and other early-stage startups need to develop to bring products to market.

2.2.4.2 Hubs distribution by geography

Out of the 127 hubs, almost 70% are based in Africa, with South Africa having the largest concentration of hubs (22%), followed by Nigeria (12%), Egypt (12%), Kenya (10 %) and Tunisia (5%). Examples of prominent hubs in the region supporting DeepTech startups can be found in [Annexure 5](#).

The presence of international hubs operating in Africa and offering support to DeepTech startups is remarkable. Examples include Illumina Accelerator, Google for Startups, The Institute for Blockchain Studies, Y Combinator and WeRobotics.

The map below shows the distribution of both Africa-based and international hubs providing support for African DeepTechs.

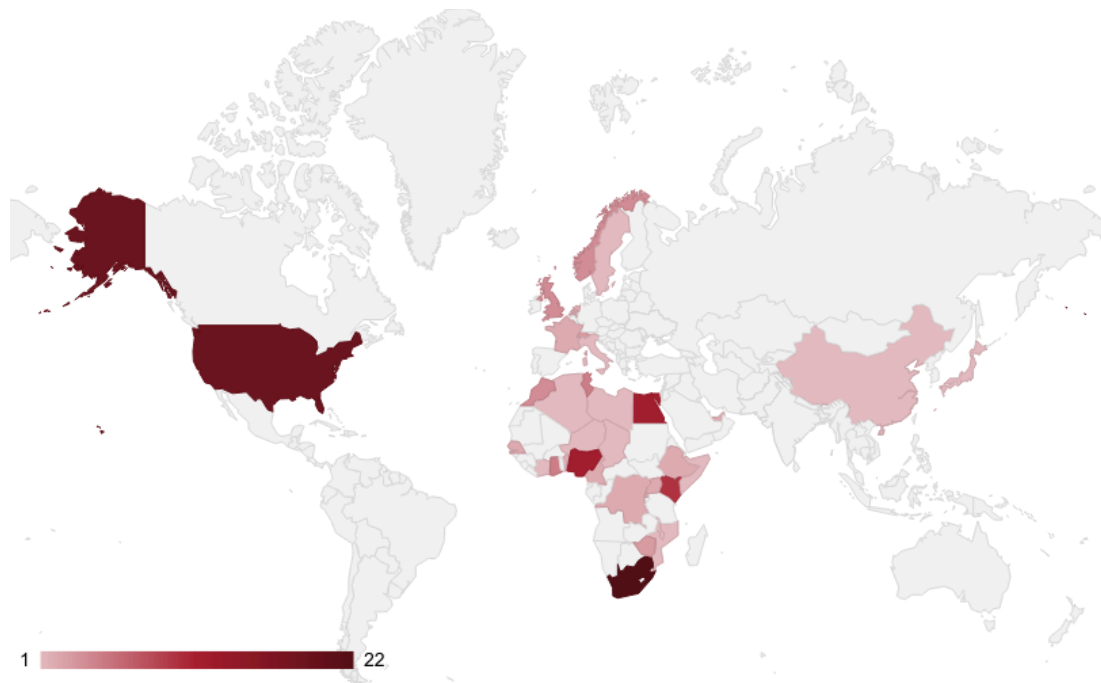


Figure 17: Geographic distribution of hubs supporting DeepTech in Africa

2.2.4.3 Hubs distribution by type

As DeepTech startups require specific support, having DeepTech-focused hubs or programmes is needed to adapt the services to their specific needs based on their unique

journey compared to other startups. The analysis shows that only 25% of the mapped hubs are DeepTech-focused or offer a programme focusing on one of the core Deep technologies. The majority (75%) offer programmes open to DeepTech startups among other types of startups.

Aside from technical assistance and linkages services, some hubs also act as investors as they provide access to capital. The data shows that almost 30% of the mapped hubs have directly invested in some of the mapped DeepTech startups. Examples include MEST Africa, Microsoft 4Afrika, Google For Startups and Y Combinator. Hubs also invest through competitions such as the MIT Inclusive Innovation Challenge (IIC) and Milken-Motsepe Innovation Prize Program offering grants/awards at the end of the programme. In terms of typology, almost 50% of the mapped hubs are accelerators, followed by incubators (30%) and innovation hubs (11%). This highlights the gap in terms of support availability for DeepTech startups at the very early stage, usually associated with the R&D phase where access to technical assistance and capital is needed to build the product and become eligible to join acceleration programmes to access support the commercialisation. The predominance of accelerators, which typically support more mature startups, also illustrates this gap and suggests the support ecosystem is skewed towards startups that have already developed a product to some extent, which leaves very early-stage deep tech startups at a disadvantage.

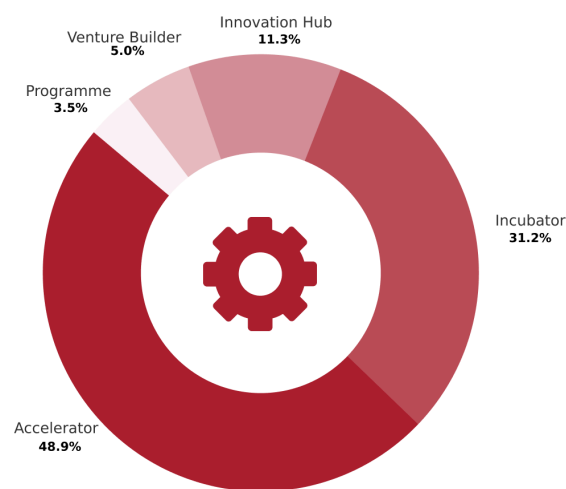


Figure 18: Hubs distribution by type

Case Study: SAVANT, supporting hardware startups in South Africa

Savant Incubator was launched in 2017 by Savant in partnership with SIDA. The incubator offers support to early-stage hardware entrepreneurs, helping them build businesses, prove concepts, raise funding and take their technologies to the next level.

The incubator brings commercialisation know-how and experience to the South African landscape, offering commercialisation support to hardware entrepreneurs through long-term, risk-based partnerships. The entrepreneurs are supported from minimum viable product development to early market traction, both locally in South Africa and internationally. The incubator also helps investors gain early access to the pipeline of professionally de-risked companies to invest in.

To offer its support, Savant adopts a 5 staged approach (the incubator and larger Savant):

1. **Sourcing and building;** Entrepreneurs or companies are introduced to the incubator through trusted network partners including IP attorneys, VCs, The Technology Innovation Agency (TIA) and universities. The incubator then conducts due diligence whereby they assist the entrepreneurs in defining the market, financial modelling, business structuring and formulating high-level strategies for their businesses. If the business meets all the requirements, it is presented to one of Savant's Investment committees for deliberation and a final decision on funding.
2. **Seed Incubation:** Once ventures progress through due diligence, Savant invests a minimum of R50,000 in the venture and the business growth process gets underway. Prototyping and proof of concept take centre stage, whilst corporate identity, IP registration, business infrastructure, corporate governance and the like are developed in parallel, guided by Savant. The end of this stage results in substantial further de-risking for the follow-on investor.
3. **Technology Development:** Once the proof of concept is established, further prototyping, and market testing may still be required as a part of industrialisation. During this stage, activities may include IP protection, setting up manufacturing relationships, and building the team. At this stage, Savant drives the commercial outcome and all efforts are made to ensure the technology is ready for market.
4. **Venture and grow Locally:** At this stage, the focus is on venturing and growing locally in South Africa. Savant helps secure Series A and after the funding helps in implementing the marketing strategy and launching the product into key sectors. The emphasis is placed on obtaining commercial proof of concept, building the team, identifying partners, and getting the innovation ready for international scaling.
5. **Venture and grow internationally:** Once the venture is successfully selling products on the local market, Savant assists in finalising Series B Venture Capital investment. The international market entry strategy is set in motion and the brand is launched in key identified global markets. Savant continues to provide strategic

support and maintains a board presence.

To date, the incubator has assisted 9 companies in raising more than R200 million in funding. These companies have employed 300+ people and have generated more than R 3.5bn in revenue.

Most of the companies that they have worked with have successfully raised finance (or are in the process of doing so) and are either in the commercialisation phase or have successfully launched onto the local and global markets. Examples of successful Savant companies include Snuza, Leatt, and Veggie Crisp.

2.2.5 Corporates

2.2.5.1 Mapping DeepTech corporates in Africa

The mapping exercise revealed the presence of at least 78 corporates active in the startup ecosystem across the continent with 67% being global and 33% being Africa-based.

Corporates have an interesting role to play in driving the DeepTech space as they can provide many services to support DeepTech innovations throughout their journey, from access to infrastructure to access to expertise and networks. Corporates may also be users of DeepTech solutions. In addition, corporates interested in the DeepTech space can also act as funders or even acquires, as we have seen with Africa's largest exit to date, InstaDeep, where BioNtech moved from being one of their partners to becoming the acquirer.

Core corporate activities to support DeepTech startups include a) launching or being part of programmes dedicated to startups such as Orange through the Orange Development Center or AWS through AWS for Startups b) partnering with startups such as BioNtech partnership with InstaDeep before the acquisition, and c) investing in startups through a corporate investment arm such as Microsoft's M12, Toyota Tsusho's Mobility 54 and Mitsubishi's ME Innovation Fund.

Based on the mapping exercise, corporates active in the DeepTech space are located respectively in the United States of America, South Africa, Japan and France.

2.2.5.2 Corporates distribution by sector of activity

Corporates investing in startups either invest directly such as Hanover Re in LifeQ, a biotech that deals with wearables, or indirectly through funds and thus become a Limited Partner. An example is L'Oréal investment into the Partech Africa fund, a sector-agnostic fund with a mandate to invest in Africa.

Big corporates represent the group with the highest activity (42%), followed by banks (25%), Big Techs (21%) and Telcos (11%). In terms of industry/ field of the corporates, banking and finance leads with 28.8%, followed by Information Technology (19.2%), Telecommunications (12.3%) and transport & mobility (6.8%).

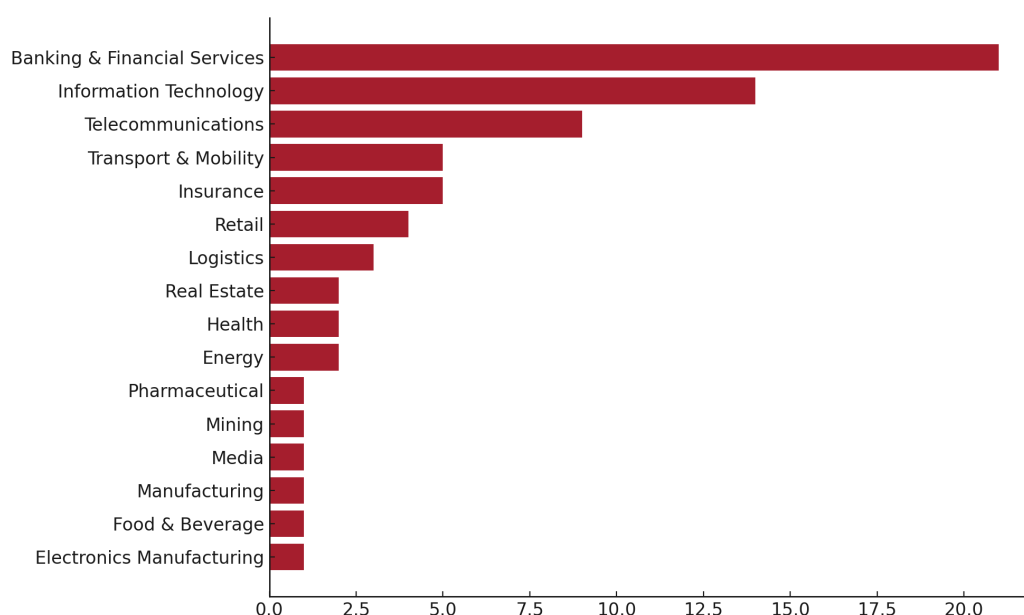


Figure 19: Distribution of corporates across industries

Case Study: Intel: Accelerating the African DeepTech ecosystem

Intel Corporation, founded in 1968 is an American multinational corporation and technology company. It is the largest semiconductor chip company in the world. The corporation has been involved and seen to support Africa's DeepTech ecosystem in different ways including programs and partnerships.

In 2022, Intel Corp and AfriLabs partnered to co-host a roundtable in Kenya dedicated to early-stage DeepTech investors. The event facilitated critical dialogues and networking opportunities, connecting investors with the DeepTech scene in Africa. In the same year,

and as a follow-up to the roundtable event, Intel partnered with AfriLabs and Briter Bridges to publish a report evaluating the African DeepTech startup ecosystem, a significant contribution to understanding the landscape. The report provided [insights into the state of the landscape](#) highlighting areas for growth and investment.

Since the role of universities has been revealed as the key to generating the pipeline of African DeepTechs, Intel Corp, in partnership with two universities namely the University of the Witwatersrand, Johannesburg and Tshimologong University conducted a study [“Evaluating the African DeepTech Spin-Off Ecosystem from Lab to Market”](#). The report investigates the gap in the commercialisation of research in Africa, particularly the creation of spin-offs.

Other partnerships initiated by Intel Corp to support the African DeepTech ecosystem include the partnership with Flapmax to accelerate AI innovations in Africa and Intel's partnership with Modus Africa aimed to empower startups, founders, and ecosystems across the continent by combining Modus Africa's VC expertise and Intel's resources to identify Africa's boldest entrepreneurs and support them throughout the startup lifecycle.

Aside from Africa-focused initiatives, Intel has 'Intel Ignite', a DeepTech-focused startup accelerator programme, a strategic initiative targeting early-stage DeepTech companies with bold, innovative ideas. This 12-week program offers tailored mentorship and resources in various domains such as product development, technology, business, and finance. The program's unique approach focuses on startups with initial funding, aiming to significantly enhance their performance and market impact.

Another initiative is IntelOneAPI, a virtual global acceleration program representing Intel's commitment to nurturing cutting-edge startups in accelerated computing fields such as AI, Machine Learning, and Analytics. This free membership program offers startups extensive technical resources, training, consulting, and go-to-market support, fostering innovation and growth without the restrictions of cohorts or equity stakes.

2.2.6 Universities

2.2.6.1 Mapping of DeepTech universities in Africa

The mapping exercise revealed the presence of 100+ universities with at least one research lab across the continent.

Universities have been revealed as the powerhouse of DeepTech innovations in Africa as many innovations start at the university level. Support provided by universities differs based on the country. Nick Allen, Managing Partner at Savant suggests that “*countries with the*

strongest educational infrastructure and quality usually provide the best DeepTech innovations. This is why we are seeing the majority of DeepTechs emerging from countries like South Africa, Tunisia and Egypt". Moataz Kotb from Cultiv'Ventures on the same point says: *"The more advanced the university system is the more the DeepTech ecosystem is developed"*. Universities play a key role in building the pipeline of DeepTech innovations by providing the infrastructure and equipment needed for R&D and offering access to expertise, among other support services. In established ecosystems, this is usually done through Technology Transfer Offices (TTOs). TTOs are entities responsible for accelerating the research phase, supporting IP structuring and management, and facilitating the transition of innovations from the research labs to the market.

2.2.6.2 Universities Distribution by Geography

Looking at the 11 markets of focus of the study, South Africa (25%), Egypt (20%) and Tunisia (13%) are identified as the markets with the largest number of universities, further reflected by the number of innovations coming from these countries.

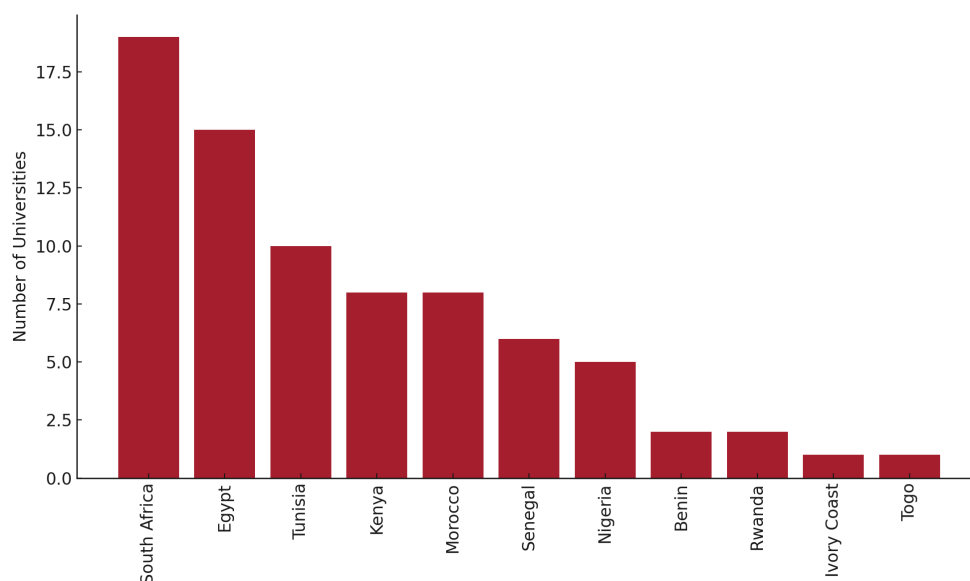


Figure 20: Universities presence in the 11 markets of focus

While a strong presence of universities is noticed in North African markets namely, Egypt, Tunisia and Morocco, other countries such as Rwanda, Ivory Coast and Togo, show a

moderate to a small number of well-equipped universities. The mapping revealed a handful of DeepTech solutions stemming from these markets.

Case Study: The Mohammed VI Polytechnic University (UM6P) in Morocco: Building a DeepTech ecosystem for university-driven innovations in Morocco.

The University Mohammed VI Polytechnic (UM6P), a Moroccan non-profit private research university, was officially inaugurated in 2017. Dedicated to applied research and innovation, UM6P aspires to be recognised among the top global universities in these domains.

Central to its mission, UM6P emphasizes research, innovation, and entrepreneurship. It fosters an environment where students and researchers are empowered to become leaders and lifelong learners, equipped to address Africa's significant challenges. The university actively supports student-led entrepreneurial ventures, providing multiple research facilities and labs for creation and innovation.

In August 2020, UM6P introduced the U-Founders startup support program, designed to aid visionary researchers and entrepreneurs. This program aims to cultivate innovative startups in diverse fields, encourage entrepreneurial mindsets, and value the university's research efforts. U-Founders features modules on entrepreneurship and innovation, along with pre-incubation and incubation programs, catering to students, researchers, and entrepreneurs within UM6P's ecosystem. These initiatives are segmented into "DeepTech" and "Shallow Tech," which promote both groundbreaking innovations and business models grounded in existing technological advances. U-Founders, UM6P's incubation program with a duration of 6 to 24 months, has supported over 105 startups across approximately 15 verticals.

Additionally, UM6P operates a Technology Transfer Office (TTO), which oversees technology transfer and the enhancement of Intellectual Property (IP) developed at the university. The TTO's role includes IP protection, managing relations between UM6P and its staff, and facilitating the transfer of inventions to the socio-economic sector, all following international standards and best practices.

UM6P also operates UM6P Ventures, an early-stage venture fund investing in pre-Series A startups through two specific funds: Digital Transformation and DeepTech Ventures.

The university's startup campus, StartGate, hosts 12 programs that support the inception and growth of startups. These programs aim to cultivate future entrepreneurs and assist mature startups in accessing international markets and investments and involve

collaboration with both national and international partners. For instance, one of its programmes (the Explorer program) is in partnership with MIT's Sandbox program and supports project leaders from five Moroccan universities. Its Moroccan Retail Tech Builder (MRTB), co-created with the Ministry of Industry and Trade and the OCP Foundation, aims to digitalize Morocco's retail sector, having supported over 40 projects.

UM6P has also partnered with Plug&Play, a renowned innovation platform from Silicon Valley, to expedite the growth of mature Moroccan startups and facilitate their access to international investors.

In April 2023, UM6P announced a significant achievement: the support of 500 startups over the past three years through its various programs, covering stages from pre-incubation and incubation to acceleration and venture building

2.2.7 Government

Governments play a key role in driving DeepTech innovation at the local level, starting from providing supportive frameworks and dedicated agencies to stimulate entrepreneurship and innovation at the local level, to providing policies and regulations supporting R&D and facilitating access to data.

Startup Acts are emerging and comprehensive legal instruments aimed at fostering the creation and development of startups, taking into account their particular needs. They are often designed through a participatory process involving the collaboration of different stakeholders in the entrepreneurship ecosystem. Although Startup Acts are still relatively new in the African context, if well designed, they can have a significant impact on improving private sector development and tackling high unemployment rates and economic gloom.

Out of the 11 countries of focus of this study, 4 already have Startup Acts in place, namely Tunisia (2018), Senegal (2019), Nigeria (2022) and Ivory Coast (2023), 4 are in the process of developing one namely, Kenya, South Africa, Rwanda and Togo, and 3 do not have a Startup Act in place but have introduced incentives and measures for entrepreneurs and investors such as the General Tax Code Act in Benin, the investment law and the five-year tax exemption in Egypt, and lastly, the Innov Invest Fund in Morocco.

Aside from the legal frameworks, governments usually designate an entity in charge of implementing the legal framework and/or supporting the startup movement. The map below

presents the innovation agencies in the 11 countries of focus, more details on the role of these agencies can be found in [Annexure 6](#).

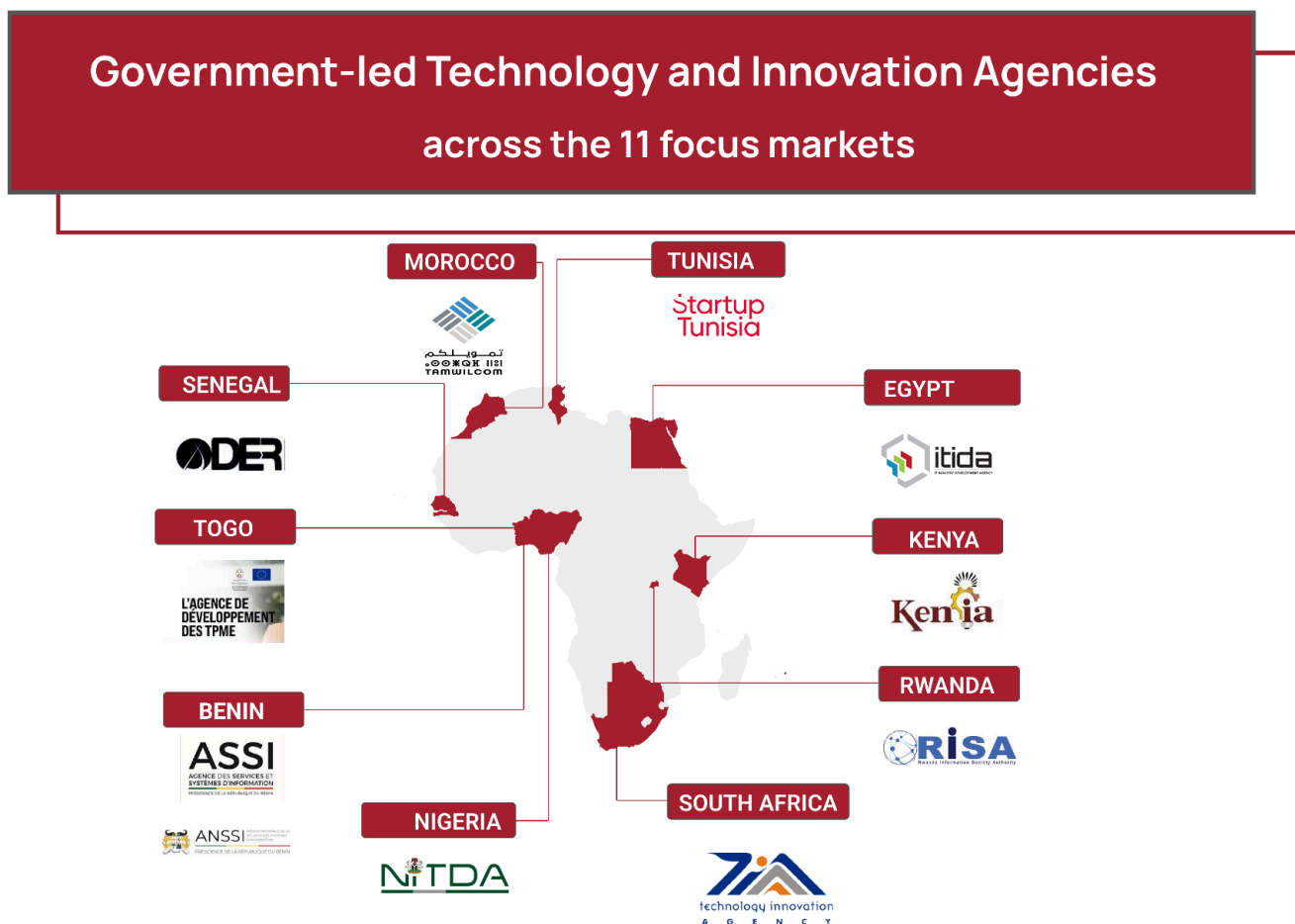


Figure 17: Map of government-led innovation agencies in the 11 markets of focus

Case Study: South Africa's Technology Innovation Agency (TIA), a government-led engine to drive innovation and R&D.

South Africa's [Technological Innovation Agency \(TIA\)](#) was launched on 29 October 2010 in terms of the TIA Act [No 26 of 2008] with the mission to support the state in stimulating and intensifying technological innovation to improve economic growth and the quality of life of all South Africans by developing and exploiting technological innovations. This is in support of the National Development Plan (NDP) that highlights that Science, Technology and Innovation (STI) is key to equitable growth, underpinning economic

advances and improvement in health systems, education and infrastructure.

TIA was set up as a public entity that enhances the country's capacity to translate a greater proportion of local research and development (R&D) into commercial technology products and services. The agency is tasked with exploiting the existing body of knowledge at universities and public research institutions and channelling it effectively towards the development of technology-based industries.

To meet its mandate, TIA provides and mobilises financial and non-financial support across broad technology areas in various sectors of the economy through:

- Appropriately structured financial and non-financial interventions for the commercialisation of R&D results.
- The development and maintenance of advanced human capacity for innovation as opposed to just R&D human capital; building a culture of innovation in the South African economy.
- Leveraging local and international partnerships to facilitate inbound technology transfer, build local technological competencies, and encourage foreign direct investment for the commercialisation of technologies in South Africa.

The goal of TIA is to use South Africa's science and technology base to develop new industries, create sustainable jobs and help diversify the economy away from commodity exports towards knowledge-based industries equipped to address modern global challenges.

To date, however, the effect of TIA on the innovation landscape has been muted.

While the overall rationale for TIA remains critical there continues to be a need for a public instrument that can close the "innovation chasm" between local R&D and commercial products and services, TIA's translation and commercialisation success rate has been suboptimal, hampered both by limited funding as well as insufficient investable projects.

The development of a more robust project pipeline, leveraging private funding, as well as following a more proactive partnership strategy with private funders and role players are required to drive the commercial viability of tech products.

2.3 Policies & Regulations

For any innovation ecosystem to thrive, the surrounding enabling environment is critical. A beneficial regulatory and policy environment can determine everything from the ease of setting up a business, the use of technology, and the possibility of attracting funding from local and international environments. As DeepTech is a field constantly evolving, with new

technological advancements made every day, it has not always been straightforward for policies to keep up with the pace of change of innovation. Aside from the generic legal frameworks providing incentives for founders and investors such as Startup Acts that have been increasingly implemented across Africa since 2018, the KII highlighted two critical policies to accelerate DeepTech innovation, namely Intellectual Property Rights Acts (IPR Acts) and Data Governance policies.

2.3.1 Institutional Intellectual Property Policies

The global economy is increasingly shaped by knowledge, innovation, and technology, with Intellectual Property Rights (IPR) playing a crucial role in fostering inventions. Intellectual Property Policies provide clear rules and guidelines for research operations, a legal framework for commercialisation, guidance for IP and technology management procedures, clear policy on ownership criteria and benefit sharing, consistency of approach, transparency in the decision-making process, and objectivity in measurement. Currently, there is no single uniform IP system or laws across the continent. Efforts targeted at harmonising IP practices regionally have been deployed through organisations such as the African Regional Intellectual Property Organization (ARIPO) and the African Intellectual Property Organization (OAPI).

IPR provides protection and recognition to startups, incentivising further creativity and contributing to economic growth. The African Union recognises the importance of IPR, with initiatives like the Continental Strategy on Geographical Indications and the African Model Legislation for the Protection of the Rights of Local Communities and Breeders. Leveraging IPR can empower African countries to compete globally. Patents, trademarks, copyrights, and geographical indications are valuable tools. Despite this potential, Africa lags in patent applications due to factors like low awareness, weak legal frameworks, and limited resources. Encouragingly, some African nations are taking steps to boost innovation and patent filings. However, challenges persist, including the absence of comprehensive national IP policies and limited local innovation. The African Union High-Level Panel on Emerging Technologies (APET) stresses the need to improve the IPR regime, advocating for public-private partnerships, closer collaboration between universities and entrepreneurs, and streamlined patent processes. Incentives, such as tax breaks for new patents, are suggested to accelerate innovation and economic development. APET underscores the importance of creating global models for IP valuation through better IP laws and regulatory guidelines. Collaboration with international organisations such as the World Intellectual Property Organization (WIPO) is proposed. Enhanced IPR can drive socio-economic development in

Africa through innovation, and collaboration among policymakers, researchers, and industry stakeholders, along with capacity building and awareness initiatives.

Case Study: The National Intellectual Property Management Office (NIPMO) in South Africa.

The management of intellectual property (IP) emanating from publicly funded research and development has become a critical factor in ensuring that the public derives greater returns from the increasingly significant R&D investments made by the government. The South African Government introduced the Intellectual Property Rights from Publicly Financed Research and Development Act 51 of 2008 (referred to as the IPR Act) to provide a regulatory framework for the management of this type of IP.

The National Intellectual Property Management Office (NIPMO) was established in mid-2011 in terms of the Act to promote and manage the objects of the Act.

NIPMO aims to ensure that recipients of funding from a government funding agency assess, record and report on the benefit to society of IP emanating from publicly financed R&D. Recipients must protect IP emanating from publicly funded R&D from appropriation and ensure that it is available to the people of South Africa. A recipient must identify commercialisation opportunities for IP emanating from publicly funded R&D.

2.3.2 Data Policies

Data is increasingly recognised as a strategic asset, integral to policy-making, private and public sector innovation and performance management, and creating new entrepreneurial opportunities for businesses and individuals. When applied to government services, emerging technologies can generate massive amounts of digital data and significantly contribute to social progress and economic growth. The central role of data requires a high-level and strategic policy perspective that can balance multiple policy objectives - from unleashing the economic and social potential of data to the prevention of harm associated with the mass collection and processing of personal data.

Africa is continuing to strengthen its data protection legal and regulatory framework. To date, 36 out of 54 African countries have data protection laws and/or regulations in place. 16 countries have signed the African Union Convention on Cyber Security and Personal Data Protection adopted on 27 June 2014 ("Malabo Convention") and 13 countries have ratified it, the latest being Niger.

Access to data is a prerequisite for value creation, entrepreneurialism and innovation. When data are of poor quality or not interoperable, they limit the capacity of firms and the public sector to engage in the sharing and analytics that can provide economic and social value to date. These processing frameworks should align with the following principles: consent and legitimacy; limitations on collection; purpose specification; use limitation; data quality; security safeguards; openness (which includes incident reporting, an important correlation to cybersecurity and cybercrime imperatives); accountability; and data specificity. Security models also need to be transversal, with a specific emphasis on cloud storage and processing of sensitive/proprietary data, API management, and support of equitable data economies. Attention needs to be paid to access to quality, interoperable and reliable data – primarily from the state but also the private and other sectors – with a reinvigoration of the principles of open governance across the continent. Capacity-building should be a key national and regional priority, and resources will need to be allocated in this regard in the areas of data protection, cybersecurity and institutional data governance in relevant agencies. Skills and an understanding of the data ecosystem will also need to be built in state institutions, amongst other sectors and communities.

Spotlight: Data protection related to AI usage in Africa

The rise of AI and the processing of large datasets is raising concerns for data protection and the existence of adequate policies to ensure secure, transparent, and ethical use of sensitive data and personal information. AI integration in health and fintech, for instance, has raised concerns about how user or patient data is used, and the permission to share this information beyond its intended purpose. Implementing robust data protection measures helps mitigate the risk of misuse of data, ensuring that AI systems are developed and deployed responsibly. However, they also run the risk of reducing innovation by creating barriers to data access and use for startups. Finding the right balance to protect data, while also supporting innovation will be key. In some cases governments can even go further and open up their own large datasets in ways that support responsible innovation.

3. Challenges & Opportunities for Africa's DeepTech Ecosystem

Despite its relevance for Africa and its potential to disrupt industries and generate impact, several barriers are hindering the African DeepTech ecosystem's growth. Identifying these challenges is a key step to deploying adequate strategies and initiatives aimed at unlocking DeepTech's full potential in the region, driving investment, and generating impact.

Each country faces different challenges depending on context and ecosystem maturity. However, since the African DeepTech ecosystem is quite nascent, challenges can be considered regional rather than country-specific.

In this section, findings from the data and insights captured throughout the engagement phase with active players in the DeepTech scene in Africa are leveraged to highlight some of the most prevalent obstacles limiting growth and present potential pathways and recommendations for addressing them.

1) Lack of supportive policies and an enabling environment for R&D and innovation in the region. Many African governments are not aware of the potential for DeepTech to contribute to economic growth and are not prioritising providing an enabling environment for research and innovation. The study reveals that African markets are moving at different paces in terms of regulations and policies. For instance, despite South Africa being a pioneer in adopting the IPR Act law for R&D innovation, they are still in the process of establishing a Startup Act. Additionally, for some countries where National AI strategies have been already introduced, a gap in terms of implementation of these national plans is still missing as highlighted by Olivier Gakwaya, Project Manager at Smart Africa. Moataz Kotb, Managing Director of CultivVentures says: *"Governments in the region have to back DeepTech. If you look at international markets, the only DeepTech ecosystems moving are those backed by the government."*

- **Create a startup and a DeepTech-friendly policy environment.** This includes 1) regulations and policies aimed at accelerating innovation, such as Startup Acts, 2) Intellectual Property Rights Acts to protect research innovations, 3) data-related policies such as data governance and open data laws, and 4) access to safe test environments (such as sandboxes) to enable startups to test their products before moving to market. Some African countries have been making headway, such as South Africa, which passed its IPR Act in 2008 and has assigned a national entity, NIPMO, in

charge of its implementation and ensuring the protection of public-funded research IP. Another example is Rwanda, which launched the Centre for the 4IR in 2020 with the mission to create a solid foundation to harness the 4IR by setting up data governance instruments and establishing a roadmap for a National AI Research Agenda among other areas of focus.

- **Foster knowledge sharing between governments.** As maturity differs across the region, it is key to upscale the conversation around policies to a regional level and to foster knowledge sharing. Olivier Gakwaya, Project Manager at Smart Africa says: *“Guiding the conversation and dialogue between countries to do peer exchange is key.”* He adds: *“The question today is: How can we move to the implementation? At this stage, we need to help countries go beyond defining the guidelines and move towards implementation. This can be done by creating a regional bureau of AI for example for each region of the continent as it will be easier to bring people together to harmonise policies on a regional level.”*
- **Adopting more investor and startup-friendly IP policies:** For university-driven innovations, universities often participate in IP ownership and some cases require royalties from the startup once they start generating revenues. This has been identified as one of the barriers for private investors. Adapting the strategy to find common ground with investors is needed to facilitate access to follow-on funding for DeepTech startups. Vicent Sebag from Cathay Innovation Fund says: *“Universities should adopt more startup-friendly IP policies and actively participate in the commercialisation of research”.*

2) DeepTech ecosystem fragmentation. Despite requiring a multi-stakeholder approach to enable its growth, the African DeepTech ecosystem is fragmented. KIs revealed a disconnect between the different ecosystem stakeholder groups impacting the overall DeepTech innovations development journey. The degree of ecosystem fragmentation differs across markets as for some African markets, partnerships are already in place. However, even in those markets, the gap is still present, especially in terms of alignment on expectations between partners.

- **Foster collaborations and partnerships between the ecosystem stakeholders at the local and regional levels to create a support and funding continuum for African DeepTech innovations.** Examples include UM6P Ventures collaboration with universities in Morocco, Cultiv’Ventures collaboration with universities’ TTOs in Egypt and lastly, TIA’s collaboration with universities who then connect with private investors in South Africa. Building a continuum can be done by creating co-creation and co-thinking spaces both at the local and regional levels where different stakeholders, connect and discuss needs and expectations to unlock the growth of

DeepTech. Kate Hach from Intel Ignite says: *“There is a need for a collaborative ecosystem approach where different stakeholders in the innovation landscape, including universities, governments, investors, and industry, work together to support startups. For example, a government initiative could partner with universities and private investors to provide a combination of grants, mentorship, and market access to startups.”* From the government's side, initiating strategic private-public partnerships (PPPs) to drive R&D and create a funding continuum for DeepTechs is essential. This can be done by connecting with the private sector and opening communication channels to hold strategic discussions on ways and strategies to partner with them to support local DeepTechs. A pilot PPP project can be initiated to test the partnership and its impact on the sector before replicating it. Other partnerships include:

- University and corporations to accelerate the transfer of research into marketable products. This requires universities to be more flexible in their IP policies and more proactive in commercialisation efforts.
- Investors' partnerships with hubs and universities by providing support where needed to access a vetted flow of DeepTech startups and access support on scientific due diligence.
- Investors's partnership with governments by participating in discussions with the public sector and being open to strategic collaborations. The disconnect between the government and private investors is one of the reasons hindering DeepTechs' access to capital as expectations from both parties can sometimes be misaligned, especially in terms of IP for university-driven innovations and the royalties system imposed by the government agencies that fund the research.
- VCs' partnership with corporates by acting as a buffer between startups and corporates. VCs can help manage the relationship, ensuring confidentiality where necessary, and facilitating connections that are beneficial but not overly restrictive for the startup. Corporates on the other hand can support VCs active in the space in the scientific due diligence by assisting them in assessing the technology and its relevance in the industry by leveraging their expertise before they invest.

3) DeepTech knowledge gap across the ecosystem and small pipeline of DeepTech startups. DeepTech is still “new” for Africa. A gap in terms of the understanding of DeepTech processes and applications by different ecosystem stakeholders has been revealed as a challenge that may be constraining ecosystem growth. Kate Hach from Intel Ignite suggests: *“ The path to DeepTech in Africa might be different from Europe. In Europe, DeepTech often originates from long-term research with no immediate market application, whereas in Africa,*

startups tend to address immediate problems first and may integrate DeepTech solutions later as they grow.”

- **Strengthen the understanding of DeepTech and build the local expertise to unlock the right support.** The conversation with Kate Hach from Intel Ignite highlighted the importance of understanding the entire journey that DeepTech startups undergo, from initial research to commercial success. Understanding this journey is crucial for effectively supporting DeepTech startups. Each phase requires different types of support, resources, and expertise. For instance, early-stage startups might need more support with research and prototype development, while later stages require market access, business development strategies, and scaling support. By aligning various ecosystem stakeholders to different phases of this journey, there can be a more coordinated and effective approach to nurturing DeepTech startups.
- **Build expertise and knowledge sharing amongst supporting stakeholders.** Investors and VCs need a clear understanding of the nuances of DeepTech for Africa. This can be done by providing access to educational programs and resources for VCs on DeepTech trends, evaluation techniques, and sector-specific challenges through seminars, workshops, and collaboration with experienced international VCs in the DeepTech space. It is also recommended to create digital communities and networks for knowledge sharing. Learnings from successful models from other regions outside of Africa can also be beneficial but should be adapted to the regional context. Vincent Sebag from Cathay Innovation suggests: “ *Despite the current challenges, there is optimism about the future of DeepTech in Africa, especially as the ecosystem matures and more success stories emerge. Focusing on developing local expertise, fostering community engagement, and creating conducive environments for DeepTech innovation and investment are crucial.*”
- **Prepare and strengthen the future pipeline of DeepTech startups in the region.** Building and strengthening the pipeline of talent in the region is key to driving interest and investment in African DeepTech. This can be achieved by providing startups with access to international opportunities and expertise to build and strengthen their technical capacities and translate them into DeepTech innovations for the region. Initiatives such as Africa 2 Silicon Valley (A2SV) and Deep Learning INDABA are great examples of initiatives working towards equipping young Africans with the needed DeepTech skills and creating environments for them to innovate in teams through regional hackathons and competitions. Vincent Sebag, Vice-President at Cathay Innovation highlights the importance of building communities where DeepTech startups can connect and exchange experiences and best practices.

4) Lack of business acumen within researchers hindering the research's commercialisation and startups' access to funding from private investors.

The shortage of individuals who combine technological expertise with entrepreneurial skills has been identified as a gap during the KIs. Scientists often lack the business knowledge needed to develop commercially viable research products and/or to connect and pitch to private investors. Since scientists are usually focused on research their academic curriculums do not necessarily include business/entrepreneurship modules. DeepTech startups emerging from universities often lack the business layer needed to develop commercial research products which affects their communication with private investors to access funding as raised by Nick Allen from Savant: *"There is a communication gap between DeepTech founders and venture capitalists (VCs). Founders often struggle to present their ideas in a commercially appealing way to VCs"*.

- **Strengthen DeepTech startups' business and entrepreneurial skills and/or acquire talents with the business skill set required to support the shift of focus from scientific discovery to commercial viability.** Acquiring entrepreneurship skills can be done as early as at the university level by introducing techpreneurship modules to researchers' academic curriculums. Revel Veyer from CPUT says: *"Developing techpreneurship for scientists is key. This concept involves training researchers to think commercially from the onset of their research, blending academic and business acumen"*. Another way could be offering spaces where students and entrepreneurs from different backgrounds are connected and get the opportunity to work together on projects, as suggested by both Nick Allen from Savant and Vincent Sebag from Cathay Innovation. Hubs can also play a role in building these capacities by collaborating with universities producing the pipeline of DeepTech innovations and providing entrepreneurship education for researchers. This can be done by launching joint programmes where hubs provide the entrepreneurial education needed for startups and support them in their go-to-market strategy. Kate Hach, Head of Intel Ignite Programme says: *"Entrepreneurship centres that are affiliated with but not directly part of a university can operate more flexibly and efficiently. Being independent of the university's administrative structure allows these centres to be more agile and responsive to the dynamic needs of startups and the market. They are not bound by the often slow and bureaucratic processes typical of university administrations"*.

5) Capital scarcity both at the early stage and late stage limiting DeepTech startups' growth and scaling.

Early-stage funding is crucial for DeepTech startups, especially for Africa where public funding is scarce at the R&D phase compared to European ecosystems for example. Kate Hach from Intel Ignite says: *“Increased funding for research in Africa is necessary to address the constraints caused by rapidly growing student populations. This funding can come from both public grants and private investment. For example, a university in Africa might receive government funding for basic research but require private investment to take a promising technology to the commercialisation stage”*.

➤ Unlock more capital targeted to DeepTech to support the R&D phase.

Governments have a role to play in supporting DeepTech innovations at this stage by unlocking public funding - ideally through grants to avoid the dilution of the startup- to enable their transition to the post-R&D phase and thus have more chances to access private investors. In doing so, governments will act as a buffer for future investors as they will only deploy funding on quality DeepTech innovations with high potential for growth and impact generation. This is the case in South Africa where the government is supporting university research by injecting capital via TTOs. Incubators and accelerators can also step in at this stage by giving access to grants to support DeepTech startups in the R&D phase. As for VCs, it is crucial to drive conversations with Limited Partners (LPs) on the DeepTech opportunity in Africa to unlock more funding towards DeepTech.

➤ Bridge the funding gap at the later stage and develop the ecosystem for better exits.

Vincent Sebag from Cathay Innovation notes: *“There is a lack of Series C and beyond funding in Africa, affecting the ability of startups to grow to a stage where they become attractive for acquisition or other exit strategies. This gap in the funding lifecycle can lead to promising companies failing to reach their potential or being undervalued in exits”*. The limited exit landscape in Africa impacts the overall performance of investment funds focused on the region. It also influences how investors assess risk, often leading to a preference for perceived lower-risk investments, like FinTech. One of the critical issues highlighted was the scarcity of exit opportunities for DeepTech startups in Africa. This scarcity makes DeepTech investments less attractive to VCs and investors, who are often looking for clear exit strategies to realise returns on their investments. Vincent Sebag from Cathay Innovation stressed the need for the development of the entire startup ecosystem in Africa to improve exit opportunities. This development includes nurturing more mature companies, attracting late-stage investors, and enhancing the overall business environment to facilitate exits. Corporates have a key role to play here as

they can bridge the later-stage funding gap by deploying funding into DeepTech innovations and/or can act as acquirers of innovations, as we saw with InstaDeep. He highlights: *“Corporate acquisitions are a vital exit strategy, especially in regions where IPOs or other forms of exit are less common”*.

- **Advocate regional DeepTech champions and build the business case for *DeepTech from Africa for Africa*.** The region has already started to produce its first DeepTech champions as the largest exit in Africa to date has been made by a DeepTech, InstaDeep. Despite the challenges, many other DeepTechs across the region are following a promising growth journey. Advocating for these regional champions is key as it will attract international investors. Drawing learnings from Fintech, for instance, global investors saw a pipeline of promising Fintechs emerging from Africa, and since then started sourcing and investing in African Fintech ventures. Similarly, for DeepTech solutions to become commercially viable and impactful, it is vital to build solutions for the local context. This means applying deep technologies to the contexts in which it can have the biggest effect, such as cleantech, health, agriculture, and logistics.

Case Study: The South African Model to driving local university-spawn DeepTech Innovations.

South Africa holds the biggest number of DeepTech startups and appears as one of the top markets attracting funding for DeepTech. Moreover, South Africa has been a pioneer in supporting R&D. The government has invested in building the right infrastructure to support research through universities and has a well-developed intellectual property rights environment with effective enforcement by authorities and a well-developed patent law. The establishment of the National Intellectual Property Management Office (NIPMO) in South Africa is a significant development in this regard. NIPMO is modelled after the Bayh-Dole Act in the U.S. and aims to facilitate the transfer of technology from academic research to commercial applications. In addition, the government has been supporting innovation through its public entity Technology Innovation Agency (TIA) which provides both financial and non-financial support for innovations, in the DeepTech context through the universities' Technology Transfer Offices (TTOs).

TTOs are offices related to a university with the mission to manage its intellectual property (IP) assets and the transfer of knowledge and technology to industry. In the South African context, TTOs' role is not limited to providing IP-related support for university-driven innovations, they also unlock financial resources for startups at the R&D phase which has been revealed as the most challenging phase in the DeepTech lifetime. TTOs access

capital from the TIA and then inject it into the selected university-driven innovations fueling their transition to commercialisation readiness.

It's at this stage where private investors investing at the Seed Stage (usually post-R&D and pre-revenue in the DeepTech context), such as the University Tech Fund, step in to deploy the needed capital and support to move the research to market, creating a funding continuum accelerating university-driven innovations' go-to-market. Wayne Stocks, Partner and Co-Founder of the University Tech Fund recognises the challenges when investing in university-driven innovations in terms of IP but emphasises the key role that TTOs play in building the DeepTech innovations pipeline in South Africa. Investors investing at the seed stage such as the University Tech Fund play an active role in preparing the deal flow for future investors with an interest in DeepTech but funding at more advanced stages such as Series A and above. Nick Allen, Managing Partner at Savant Venture Fund said that they have co-invested in 3 DeepTech startups with University Tech Fund to date.

Despite South Africa's strength in nurturing the journey of university-driven DeepTech innovations, a gap in funding at later stages echoes the overall lack of late-stage DeepTech investors in the region. Wayne Stocks says that the funding gap in South Africa is now in DeepTech with a Technology Readiness Level of 7 and above.

6) Limited access to support services, including access to expertise and market access for DeepTech startups. This includes access to expertise in IP structuring and management, industry-related expertise as part of the R&D phase and access to business knowledge for technology transfer. This also differs across the region, as some African markets benefit from the presence of university Technology Transfer Offices (TTOs). TTOs are the entities responsible for tech transfer and usually offer guidance on IP. Also, some markets benefit from a strong innovation ecosystem with the presence of more active DeepTech-focused VCs, hubs and corporates which provides startups with easier access to expertise.

➤ **Provide the needed support services for DeepTechs to fuel their growth journey.**

Aside from capital, DeepTech startups need support in terms of technical expertise and linkages.

- Investors are well positioned and usually have a board of advisors and connections with a network of other investors who can provide follow-on funding and corporates, leveraging these assets for DeepTech startups is key. The 7 interviewed investors all provide support services to the DeepTech startups of their portfolio.

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- Corporates can also support DeepTech startups in different ways including providing access to resources/infrastructure to develop and test their products, co-creating solutions for internal needs and bringing them to market, providing access to technical expertise both on the tech and the market access, providing access to a customer base for startups to test the product before its commercialisation, and lastly, supporting the distribution of the DeepTech innovation by facilitating access to international networks/markets and acting as a scaling partner for the DeepTech.
 - Hubs can support DeepTechs by launching DeepTech-focused programmes providing targeted technical assistance for DeepTechs. DeepTech-specific programmes are needed as they will offer support tailored to their specific needs to build investment readiness. This includes education in areas such as IP management, and scientific skills, among others. Support can also be in terms of matchmaking with business partners and investors. Open innovation programmes with corporates can drive partnership opportunities for DeepTech startups.
- **Accelerate DeepTech commercialisation.** As DeepTechs are building innovations tackling key challenges both at the local and the regional level, after the R&D phase, governments can benefit from innovations that are being developed locally to reach their national goals. Connecting with local DeepTechs and providing easy access to the public market is key to accelerating the commercialisation of DeepTech innovations.

4. Key Findings and Way Forward

Key Findings

DeepTech is emerging in Africa with much potential but in need of more coordination, direction and support. The report highlighted nine key findings for the DeepTech ecosystem in Africa:

1. **DeepTech is on the rise in Africa, mirroring global trends but it remains fragmented.** The acquisition of Deeptech startup InstaDeep at the beginning of 2023 was not noise. Africa has an active Deeptech ecosystem. More than 300+ DeepTech startups were identified in Africa, with more than 300 active investors and 120+ hubs supporting startups. Total funding to Deeptech startups from 2013 to H1 2023 was \$3bn, 15% of the total volume of funding to all startups in Africa over this period. The share of Deeptech funding has increased from 12.78% in 2019 to more than 32% in 2023, in line with global trends. Novel technologies like AI and IoT are being taken up by innovators and adopters. However, this ecosystem remains fragmented with many active investors not considering themselves Deeptech investors and a limited number of support organisations specifically focused on Deeptech. Only 25% of the mapped hubs that have supported or invested in DeepTech startups focused explicitly on DeepTech. For investors, it is even less, only 4% of the mapped investors have a DeepTech-focused mandate.
2. **The maturity of DeepTech ecosystems differs widely across countries in Africa.** The 11 countries in focus in this study include some of the most advanced DeepTech ecosystems across the continent, especially South Africa, Kenya, Tunisia, Nigeria, and Egypt. The surrounding ecosystem, including the availability of capital, R&D facilities, and an enabling policy landscape all play a big role in shaping the opportunities for both market entry at the early stages, and scale and the growth stage. The maturity level of the broader startup ecosystem also seems to have a role to play, as the top countries also see the most advanced landscapes for funding across the wider digital and technology ecosystem. This relates in part to the benefits of a stable and thriving environment but also reflects the need for widespread innovation to develop suitable applications and use cases for DeepTech to develop.
3. **DeepTech startups are different from startups adopting DeepTech technologies.** One of the unique phenomenons of Deeptech is that once it is developed and commercialised, it is rapidly diffused and applied widely by other types of businesses looking to benefit from it. Two recent examples of this were in blockchain and AI where

many startups adopted these novel technologies after their R&D phase. They typically apply these technologies to improve their operations, services or products and serve the identified market needs while being cost-effective as they do not go through an R&D phase. Adopters account for the majority of Deeptech users in Africa, with AI being the most commonly adopted technology. Innovators are a much smaller group and the focus of this study. They are at the forefront of Deeptech, building novel technologies with many of the innovations being omni-use, but currently being applied to the unique African context. For example, new battery technologies for boda-bodas, solar photovoltaics that work better in rural areas, or large-language AI models that take into account the vastness of different languages or cultures in the continent.

4. **DeepTech startups are applying emerging novel technologies to uniquely African challenges.** Similar to other markets around the world, the top four foundational technologies being applied by Deeptech startups in Africa are AI, IoTs, Solar Photovoltaics and Robotics. However, where these foundational technologies are being applied is unique to the challenges of Africa. The top sectors in terms of startup pipeline and volume of funding are energy, agriculture and health. Together startups in these sectors account for nearly 50% of all startups mapped. For example, drones are being used to deliver medical supplies in Rwanda, IoTs and solar photovoltaics are being used to improve the productivity and resilience of agricultural chains, and AI is being used for early detection of uniquely African diseases.
5. **Deeptech founders are well educated, but mostly male, foreign educated and with limited business expertise.** Nearly two-thirds of Deeptech startup founders hold a postgraduate degree including a master's, MBA or Ph.D. with more than a third studying engineering, computer science or software engineering. While very educated, the majority lack business acumen. Multiple early-stage investors and venture builders highlighted the lack of entrepreneurial skills among Deeptech innovators. Further, nearly all startups were led by male-founding teams. Gender disparity is not specific to Deeptech, as only 24% of funded startups across Africa have at least one female founder. However, it is worse in Deeptech. Only 13.5% of Deep Tech startups have at least one female founder.
6. **Universities are powering the Deeptech innovation pipeline in Africa, but remain limited and constrained to effectively work with the ecosystem.** Deeptech innovators require deep engineering and scientific expertise. Briter's data shows that more than a third of Deeptech innovators received an engineering, computer science or software engineering degree. Many universities have established labs to help translate this expertise into novel technologies and commercial applications. As a

result, universities are the main drivers of the DeepTech pipeline in Africa and the markets with the strongest educational infrastructure are producing the most DeepTech Innovations. South Africa, Egypt and Tunisia have the most universities across Africa and also have the most Deeptech startup innovators. However, many countries like the quality of universities needed to support DeepTech. Further, many ecosystems are struggling to work with quality universities when they are present due to restrictive IP policies and the limited exposure founders get towards the commercial side of running a startup. As a result, many early-stage investors struggle to fund novel technologies or assist in commercialising startups that have started in Universities.

7. **Unlike more developed markets, corporates have had limited involvement in shaping DeepTech in Africa.** Despite the different areas of support that corporates could offer to African DeepTechs, their involvement in the value chain to date remains limited. Corporates are yet to see the value-add of collaborations with African DeepTechs. This can be in part explained by the lack of visibility on the technologies being built on the continent. Corporates can support DeepTech either directly through their dedicated startup programs such as Intel Ignite by Intel, or by becoming investors or acquirers as we've seen with BioNTech with InstaDeep, or indirectly through VCs, hubs and universities that can help them access and connect with the right DeepTech innovators based on their areas of interest.
8. **Most government support for Deeptech falls into general innovation support, but some more targeted policies are emerging.** African governments are increasingly focusing on driving digital transformation and introducing policies and incentives aimed at promoting innovation and entrepreneurship reflected in their national strategies as well as the introduction of specific legal frameworks to support tech innovators. However, many are still lagging in terms of policies dedicated to supporting R&D and DeepTech innovation specifically such as Intellectual Property Rights Acts to protect research innovations and data governance laws enabling access to public data. It is worth noting that African countries are moving at different paces in this matter and that the need to introduce regional or even sub-regional policies to support DeepTech have been expressed by many actors in the space.
9. **Funding gaps are present across all stages but the late stage presents the biggest challenge.** Funding gaps are limiting the overall growth of the sector. The majority of deals are at the very early stage, but they are very small, representing less than 2% of total funding and relying mostly on early-stage investors and angels. Very few governments or donors provide grant funding, a common phenomenon in more developed markets used to de-risk innovation and investment in Deeptech which

often requires a lot of capital early on for the R&D phase. At the late stage, there is a fall-off in deals and limited exits where the impact of Deeptech innovations can be fully realised by the market, as well as for investors. InstaDeep has been an exception, rather than the rule. This late-stage funding is needed to create the right incentives for early-stage investors who are taking on bigger risks for unproven technologies and startups.

Way forward

The DeepTech revolution is well underway globally and in Africa. While technologies are being developed at different paces across the world, and much faster across the Global North, innovators across Africa are on the move. Increasingly more industries are seeing the application of DeepTech to tackle local challenges, drive 4th Industrial Revolution developments in the region, and increase economic growth. Numerous strides have already been made within the space of AI, biotech, and other domains to create solutions tailored for the African context. These solutions are targeting problems that have hamstrung the continent for decades such as food production, energy security and disease. With a fast-rising ecosystem of innovators, increasing access to capital, enabling policies, appropriate infrastructure, and an expanding skilled workforce Africa is primed to take advantage of the opportunity that DeepTech presents. But it won't happen automatically. Stakeholders need better information and coordination, more capital, and fewer policy and regulatory hurdles to jump. If done right, this could not just unlock DeepTech in Africa, but a new frontier of innovation in Africa at a time when it is likely to be needed most.

Annexures

Annexure 1: Innovators VS Adopters: Key Differentiators

Aspect	Innovators	Adopters
Data Creation (AI)	They generate or collect proprietary data sets. This could include both software and hardware innovators, such as those developing new sensors or imaging technologies.	Use existing data sets, focusing more on application rather than creation. This includes companies that might use data from existing technologies for new applications.
Role in Technology	At the forefront of creating new technologies or significantly improving old ones which includes both AI and hardware innovations	Utilise existing deep tech technologies to enhance operations, services, or products. This could mean adopting new AI systems or integrating hardware into existing setups
Nature of Innovation	Responsible for breakthroughs and offering new solutions, often having Long R&D cycles. This includes developing new hardware solutions or AI algorithms.	Driven by market needs or cost-effectiveness, focusing on practical application in specific contexts. This might involve applying an existing technology in a novel way.
Risk Profile	High risk-taking, often venturing into untested or new areas. This includes both hardware and software realms.	Lower risk, as they leverage proven technologies. They may introduce risk by applying technology in new contexts or markets.
Market Orientation	Often Driven by the potential for breakthrough and innovation	Driven by immediate market needs, cost-effectiveness, and practicality.
Customisation and integration	May develop highly specialised solutions which can be either hardware or software..	Identify and integrate existing technologies into their offerings, often customising to fit their contexts.
Investment in R&D	Have strong foundational R&D and invest heavily in it	Focus more on application and adaptation rather than

		foundational R&D
Example applications	A company building drones that could be used in agriculture for precision farming	Fintech platform using AI chatbots and virtual assistants to help customers make financial decisions

Annexure 2 : Categorisation and various examples

Technology	Associated Products	Application Use Cases	Industries
Focuses on “how” something is done or “what” methods are used. These are the fundamental scientific and engineering principles that underpin each startup. They provide the foundation upon which other components are built.	A mix of hardware and digital solutions showcasing the tangible manifestations of the base technologies and addressing particular needs or problems.	This category illustrates how technologies address specific challenges in the African context, demonstrating their real-world applicability and adaptability.	Based on the primary industry that benefits from the technology, highlighting the diverse impact of deep tech across multiple industries. A majority of them can be applied to multiple industries
3D Printing	3D Printers, Rapid prototyping machines	Medical Equipment, E-Waste, STEM Education, Design Prosthetics	Health & Biotech, Education, Waste Management, Manufacturing
Advanced Material	Advanced Material	Road construction	Manufacturing
Artificial Intelligence (AI)	Robo Advisors, Cognitive Analytics, Chatbot, Big Data & Analytics, Machine Learning, Wearables	Process Automation, Precision Agriculture, Alarm Systems, Diagnostics, Retail Intelligence, Business Intelligence, Energy Management, Cognitive Analysis, Sports Analytics, Data	Mobility, Construction, Waste Management, Agriculture & Agtech, Health & Biotech, Retail, Sports, Finance & Fintech, Software, Utilities, Telecom, Security

		Labelling, Drug Authentication, Addressing Systems, Investment Platforms, Medical Diagnostics, Medical Research, Software Development, Health Monitoring, Collision Prevention, Fleet Management, Waste Recycling, Trackers	
Augmented Reality (AR)	Interactive Displays, Augmented Reality (AR), VR Headsets, Design, Immersive Content	Holograms, Business Intelligence, Gaming, Furniture, Content Development, Medical Simulation	Software, Entertainment, Manufacturing, Education, Health & Biotech
Batteries	Solar Grids, Electric vehicles, Electric Boats, Smart Meters, Batteries, Charging Infrastructure	Energy Access, Ride Hailing, Marine Mobility, Mobility, Energy Management, Energy Storage, Delivery, Charging	Renewables & Cleantech, Mobility, Manufacturing, Logistics
Biotechnology	Bio Material, Genomics, Protein, Medical devices, Stem Cells, Testing Kits, Sensors, Plastic Waste	Genomics, Drugs & Medicine, Drug Discovery, Food Production, Health Monitoring, Genetic Testing, Diagnostics, Medical Equipment, Animal Feed, Microalgae Production, Waste Recycling, Medical Research	Health & Biotech, Agriculture & Agtech, Waste Management
Blockchain	Solar Grids, Web3, Drones, Cyber	Energy Access, Cyber Security, Medical	Renewables & Cleantech, Finance &

	Security, Cryptography, Big Data & Analytics, Blockchain Applications, Identity, Digital Assets	Delivery, Data Protection, Data Storage, Agent Network, Identity Management, Diagnostics, CyberSecurity	Fintech, Health & Biotech, Security, Software
Cloud Computing	Cloud Computing	Data Storage, Business Intelligence, GeoLocation	Software, Agnostic, Finance & Fintech
Electronics and photons	Telescope	Radio Astronomy	Aerospace
Industry 4.0 (Industrial IoT, AI, Robotics, etc.)	Agnostic	Business Intelligence	Manufacturing
Internet of Things (IoT)	Sensors, Smart Meters, IoT, Smart Solutions, Satellite Internet	Soil Testing, Energy Management, Cyber Security, Connectivity, Home Automation, Remote Sensing, Waste Cleaning, Precision Agriculture, Safety, Wi-Fi, Trackers, Wearables	Health & Biotech, Utilities, Manufacturing, Agriculture, Agnostic, Marine, Transport & Mobility, Construction, Software, Sports
Pervasive Connectivity (e.g., 4G/5G/Wi-Fi 6E)	Connectivity	Big Data & Analytics, Satellites	Aerospace, Telecommunications
Robotics	Drones, robots	Aerial Imagery, Topography, Precision Agriculture, Agnostic, Delivery, Photography, STEM Education, Automation, Process Automation, Eye Health, Prosthetics, Waste Recycling, Military Combat, Health Monitoring	Health & BioTech, Education, Agnostic, Logistics, Aerospace, Agriculture & Agtech, Manufacturing, Construction, Defense, Waste Management

Semiconductors	Integrated Circuits (ICs)	Cybersecurity	Manufacturing
Sensors	Wearables	Health Monitoring	Health & Biotech
Solar photovoltaics (PVs), Smart batteries	Solar Grids, Solar Lamps, Power Backup Systems, Smart Solar Inverter, Solar Powered Water Pumping Systems, Solar Powered Street Lightning Systems	Energy Management, Cold storage, Energy Access, Solar Home Kit, Fish Farming	Renewables & Cleantech, Utilities

Annexure 3: Key differences between university-driven DeepTech innovations, industry-spawn DeepTech innovations and Corporate Spin-Outs

Aspect	University-driven (spin-offs)	Industry-spawn	Corporate spin-outs
Source	Academic institutions and research labs	Entrepreneurial ventures, startups	From within large companies/corporates
Nature of the innovation	Often deeply scientific, research-intensive	More focused on market needs, commercially oriented	Industry-specific, more aligned with the company's strategic goals.
Commercial readiness	Typically requires more R&D for market readiness	Generally more prepared for immediate market entry	Generally more market-ready
Investment and funding	May rely more on grants, academic funding	Often seek venture capital, angel investors	Usually backed by the parent corporation but may also seek external funding

Business orientation	May need additional support in business planning and management	Usually have inherent business planning and acumen	Often inherit established business models and are oriented towards enhancing or expanding the existing business lines of the corporation
Market integration	Challenges in bridging the gap between research and market application	Better positioned for quick market integration	Often have an easier time integrating into the market, benefiting from existing networks and brand recognition
Scientific depth	Higher breakthrough technologies, novel solutions	Varied; can be high but often less research-intensive than university projects	Often leverage the substantial research capabilities of their parent corporations, resulting in innovations with considerable scientific depth. However, this depth may be more directed towards practical applications and industry needs compared to the more theoretical or exploratory nature of university-driven deep tech
IP Management	Need for structured intellectual property protection and commercialisation strategies	Likely to have clearer strategies for IP management	Well-structured intellectual property frameworks, benefiting from the established IP strategies and legal resources of their parent corporations

Scalability	Scalability may be secondary to scientific innovation	Scalability often a primary concern from the outset	Often focused on enhancing or diversifying existing corporate offerings
Collaborations	Potential for partnerships with industry for applied research	More direct engagement with markets and consumers	Benefit from collaborations between corporate entities and various market players, often leveraging the parent company's network for partnerships
Typical challenges	Transitioning from R&D to commercial product, navigating bureaucracy in academic settings	Balancing innovation with market demands, securing funding	Navigating larger corporate structures and aligning their innovations with the broader strategies of the parent company

Annexure 4: Considerations for including cleantech

The table below highlights the main differences when cleantech is considered DeepTech and when they are not considered as such based on three aspects namely: The technological complexity, the innovation focus, and the interdisciplinary nature of the product.

Aspect	Renewable/Clean tech as DeepTech	Example	Renewable/Cleantech not as a DeepTech	Example
Technological complexity	High-tech innovation and complex scientific advances	Advanced solar materials, nanotechnology in renewable energy	Some solutions are standard not complex	Conventional solar panels, basic wind turbines
Innovation focus	Focus on ground-breaking	Development of new renewable	Primarily scaling existing	Widespread implementation

	transformative technologies	energy storage solutions	technologies	of existing solar technology
Interdisciplinary nature	Integration of multiple advanced fields	AI for smart grid management in renewable energy	Focus on a single or a less complex domain	Standard renewable installations without advanced integration

Annexure 5: Example of active DeepTech hubs in Africa

Hub	Country	Type	Duration	Description
Savant	South Africa	Incubator		Savant offers hands-on support to early-stage entrepreneurs in African hardware and deep technology companies that are underpinned by science and engineering innovations helping them prove concepts, raise funds and take their technology to the next level
DeepTech Africa	United States of America	Venture Builder	N/A	Founded out of The Legatum Center For Entrepreneurship And Development At MIT, Deep Tech Africa's mission is to build Inclusive And Sustainable Innovation-Driven Ecosystems In Africa Leveraging Deep Tech.
WeRobotics	United States of America	Innovation Hub	No set duration	WeRobotics works with local communities to create innovation laboratories, called Flying Labs, to assess if technology solutions may

				address local problems
Ebni	Egypt	Incubator		EiTESAL Business Nurturing Initiative (EBNI) is an incubation project initiated by Eitesal and other institutions with a task to boost startups in the field of ICTE, by giving them end to end support & Global footprint to start their ventures from scratch & take them into scale up. EBNI specializes in hardware based on IoT (Internet of Things)
OneBio Africa	South Africa	Incubator		OneBio Africa partners with biotech entrepreneurs, providing investment capital and support to venture build the companies of the future.
Grindstone	South Africa	Venture Builder		Grindstone is a structured entrepreneurship development program that assists high-growth innovation-driven companies to get the fundamental building blocks in place to scale quickly and become sustainable and fundable.
Utu House	Kenya	Incubator		UTU house is a hub for Blockchain and AI projects
Open Fab	Tunisia	Innovation Hub	No set duration	OpenFab Tunisia is a Tunisian association which aims to promote DIY culture, Open Source Hardware and Fablabs
Fablab Egypt	Egypt	Incubator	No set duration	Fablab Egypt is a digital fabrication lab that is a member of the Massachusetts Institute of Technology Fab Lab global network. It provides manual and digital fabrication machines, such as 3D printers, for anyone to make almost anything,

				including robotics, furniture and installations.
Technoriat by OurDigitalFuture	Tunisia	Programme		The Technoriat project aims to create a bridge between scientific research and entrepreneurship. This program, which will extend over two years, is the result of a partnership with the Association of Technopoles and the Atomic Energy Commission.

Annexure 6: List of the government-led innovation agencies in the 11 markets of focus

Country	Agency	Description
Benin	The National Agency for the Security of Information Systems (ANSSI) and the Agency for Information Services and Systems (ASSI)	The National Agency for the Security of Information Systems (ANSSI) in Benin is a key component in the nation's cybersecurity framework. The ANSSI's primary focus is to enhance digital security as part of Benin's broader efforts to transform and develop its digital economy. This agency played a crucial role in the adoption of Benin's new National Cybersecurity Strategy for 2020-2022, which aims to create reliable and secure cyberspace to foster a thriving digital economy. The strategy covers various aspects, including the protection of information systems and critical infrastructure, combating cybercrime, developing digital security skills, and fostering national and international cooperation in digital trust. The Agency for Information Services and Systems (ASSI) in Benin, on the other hand, is a government body responsible for implementing programs and projects within the development strategies for secure services and information systems. The creation of ASSI is a part of the government's vision to transform Benin into West Africa's digital services platform, aiming for growth and social inclusion.

Egypt	Information Technology Industry Development Agency (ITIDA)	The Information Technology Industry Development Agency (ITIDA) is an agency under the Ministry of Communications and Information Technology. Its main objective is to spearhead the development of Egypt's ICT industry to bolster its global competitiveness and contribute significantly to the economic growth of the country. ITIDA focuses on several key areas, including identifying the needs of the local IT industry and addressing them with well-designed programs and policy advice. It is also instrumental in building the capacities of local IT companies, attracting and servicing multinational IT companies, and nurturing a skilled, sustainable, and deployable talent pool.
Ivory Coast	No specific innovation agency but has a Fund for Science, Technology, and Innovation (FONSTI) aimed at supporting scientific research and technological innovation	The National Fund for Science, Technology and Innovation (FONSTI) is an initiative designed to boost scientific research and technological innovation in Ivory Coast. Established by Order No. 2018-593 on June 27, 2018, FONSTI was modelled after the Swiss National Fund (SNSF). Its primary purpose is to provide financial support for high-quality scientific research and technological innovation programs and projects that have the potential to contribute to the socio-economic and cultural development of the Ivory Coast. As a legal entity under private law, FONSTI is recognized as being of public utility
Kenya	Kenya National Innovation Agency (KeNIA)	The Kenya National Innovation Agency (KeNIA) is a State Corporation established under the Science, Technology and Innovation (STI) Act, No. 28 of 2013 under the Ministry of Education. The core mandate of the Agency is to develop and manage the National Innovation System. The Agency is therefore responsible for the coordination, promotion and regulation of the National Innovation System.
Morocco	Caisse Centrale de Garantie (CCG) also known as Tamwilcom	A limited company owned by the Moroccan State, TAMWILCOM capitalizes on its historical achievements as a Central Guarantee Fund (CCG) to better contribute to the removal of obstacles to SMEs' access to financing. TAMWILCOM is a public financial institution governed by banking law. It represents the sole stakeholder of the State in matters of public guarantee of financing.

		In parallel with its guarantee activity, TAMWILCOM works with its partners in the financial sector to meet the needs of Moroccan companies, thanks to a range of financing mechanisms adapted to each stage of their life cycle. This creates a leverage effect capable of supporting the growth of the national economy.
Nigeria	National Information Technology Development Agency (NITDA)	The National Information Technology Development Agency (NITDA), established in 2001 and formalised by the NITDA Act 2007, is a key public service institution in Nigeria. It functions as the ICT policy-implementing arm of the Federal Ministry of Communication and Digital Economy. NITDA's primary responsibilities include developing and regulating ICT in Nigeria, setting regulatory standards and guidelines, and advising on technology adoption. The agency also organizes various training programs for government officials and the education sector to enhance ICT skills and knowledge. NITDA has been instrumental in promoting ICT as a tool in Nigeria's education sector and plays a significant role in e-government implementation and Internet governance
Rwanda	The Rwanda Information Society Authority (RISA) - The technology Innovation Division within RISA	Established under the Ministry of ICT and Innovation; Rwanda Information Society Authority "RISA" is a public institution established in 2017 to play a role in advancing innovation and the development and adoption of new technologies in Rwanda. RISA's tasks include identifying and researching emerging technologies and trends in the ICT industry, facilitating the development of new products and services, and working alongside various government agencies, private sector entities, and international partners to foster the integration and utilisation of ICTs across different economic sectors and supporting local talent. RISA's scope encompasses a range of technologies such as artificial intelligence, robotics, big data, cloud computing, and blockchain.
Senegal	Délégation Générale à l'Entrepreneuriat Rapide des Femmes et des Jeunes (DER/FJ)	The General Delegation for Rapid Entrepreneurship of Women and Youth (DER/FJ) is a structure set up by the President of the Republic, His Excellency Mr. Macky SALL, created to sustainably establish a catalytic framework for the achievement of

		significant economic performances, the DER/FJ places its intervention within the framework of the efforts made and actions deployed by the State of Senegal and its various partners.
South Africa	Technology Innovation Agency (TIA)	TIA is a national public entity that serves as the key institutional intervention to bridge the innovation chasm between research and development from higher education institutions, science councils, public entities, and private sector, and commercialisation.
Togo	Agence de Développement des TPME	In July 2022, a decree was issued by the Council of Ministers, greatly paving the way for the establishment of an innovative national agency for the development of very small, small and medium-sized enterprises (SMEs). The structure is intended to centralise and manage all support initiatives for SMEs in a coherent and structured manner. It is also a question of more effectively controlling financing actions oriented towards the development of SMEs. Another objective is to harmonise as well as guarantee compliance with financing rules and procedures, to have a database for better monitoring, by the government roadmap 2020-2025 to help economic actors.
Tunisia	Smart Capital through Startup Tunisia initiative	Smart Capital is a management company approved by the CMF, in charge of implementing STARTUP TUNISIA. STARTUP TUNISIA is a national initiative that aims to make Tunisia a country of startups at the crossroads of the Mediterranean, the MENA region and Africa.