



FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative



State of the Digital Agriculture Sector

Harnessing the Potential of Digital for Impact Across Agricultural Value Chains in Sub-Saharan Africa



BEANSTALK

APPENDIX 4. REGIONAL D4AG PROFILES



Sub-Saharan Africa

ROLE OF AGRICULTURE AND SMALLHOLDER FARMERS IN SUB-SAHARAN AFRICA

Smallholder agriculture is of immense importance for sub-Saharan Africa, representing both a vital source of livelihood and a crucial

component of the region's economic resilience. In an area where farming is often the primary means of subsistence, smallholders contribute significantly to food security by producing a substantial proportion of the region's food supply.

| Agriculture Sector Contribution to GDP | Agriculture Sector Contribution to Sector Employment | Key Crops |
|--|--|---|
| 17.2% ⁶¹ | 52.8% ⁶² | Maize, Sweet potato, Rice, Cassava, Wheat, Fruits & Vegetables, Cocoa |
| Average Size of a Smallholder Farm | Number of Smallholder Farmers | Share of Female Workers |
| <1 ha ⁶³ | ~ 190 million % ⁶⁴ | 40-50% ⁶⁵ |

Table 27. Role of Agriculture in sub-Saharan Africa

61 World Bank Data, "Agriculture, forestry, and fishing, value added (% of GDP)", 2021

62 World Bank Data, "Employment in Agriculture (% of total employment)", 2021

63 Giller, K.E., Delaune, T., Silva, J.V. et al. Small farms and development in sub-Saharan Africa: Farming for food, for income or for lack of better options?. *Food Sec.* 13, 1431–1454 (2021). <https://doi.org/10.1007/s12571-021-01209-0>

64 CTA 2019

65 Kudama, Gezahagn, Mabiratu Dangia, Hika Wana, and Bona Tadese. "Will digital solutions transform Sub-Sahara African agriculture?" *Artificial Intelligence in Agriculture* 5 (2021): 292-300.

D4AG REACH AND ADOPTION PROGRESS IN SUB-SAHARAN AFRICA

Sub-Saharan Africa accounted for a whopping 49% of all D4Ag solutions we have identified in LMICs: as of 2022, there

have been at least **666 active D4Ag** solutions operating in the region. As found in the CTA 2019 report, the sector was and remains young, as **at least 32% of innovations have been launched after 2018**, however we have identified at least 60 solutions that went inactive in the past 5 years.

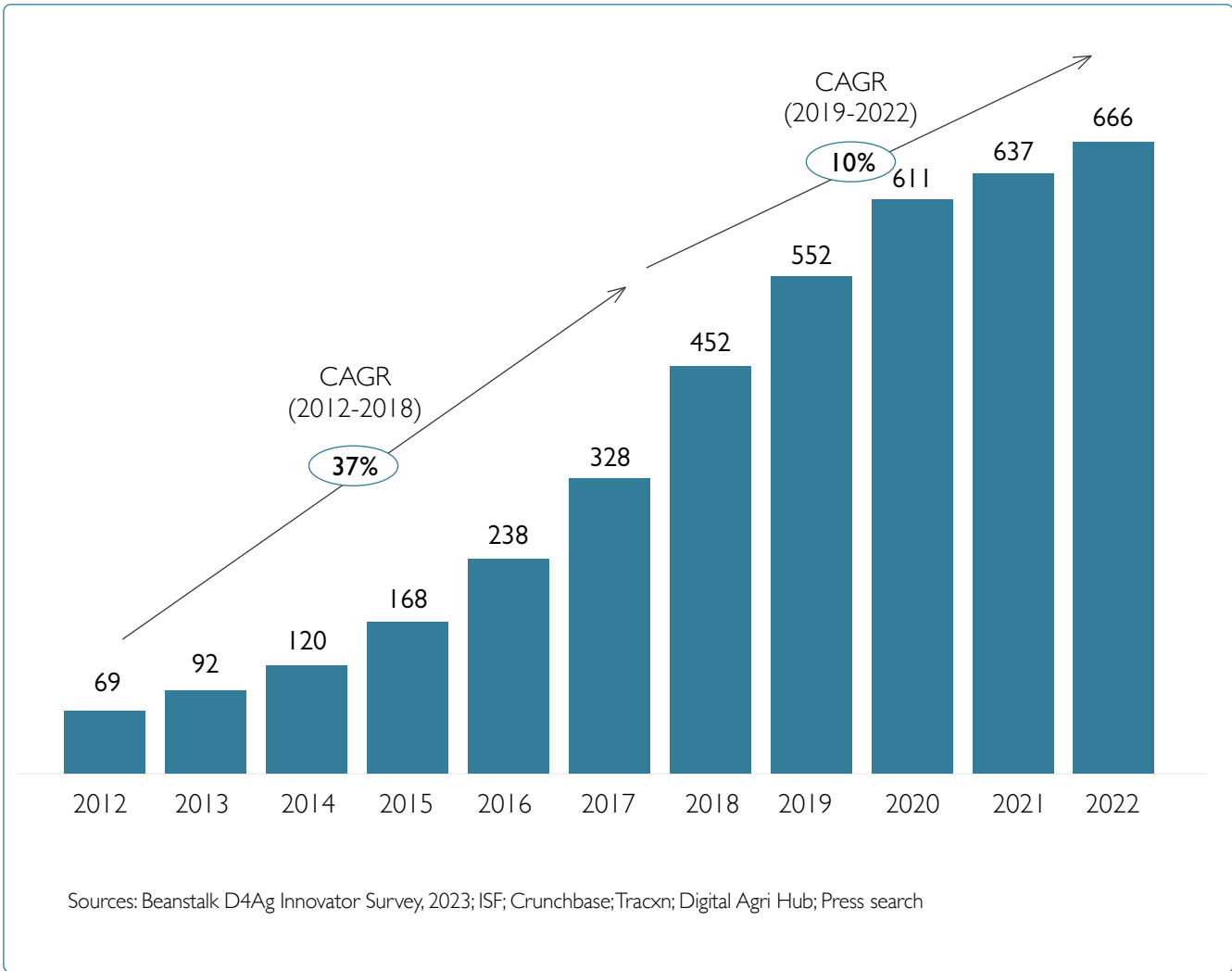


Figure 59. Number of Active D4Ag Solutions (sub-Saharan Africa), 2012 – 2022

The economics of these businesses are improving: according to our interviewees, **39% of them are breaking even, versus 26% estimated by the CTA five years ago**, demonstrating a positive trend towards more commercial stability.

The geographical reach is expanding but remains concentrated: even though we have **identified 36 countries in the region with at least one D4Ag solution being present**, more than **45% of the D4Ags are headquartered in Kenya or Nigeria** – the regional D4Ag hubs, and almost two-thirds are concentrated in the top five markets (Kenya, Nigeria, South Africa, Ghana, and Uganda).

Investments in D4Ag are on the rise, but the region remains the least funded across the LMICs: in 2021, sub-Saharan African innovators have raised \$312 million from private investors.⁶⁶ Importantly, the region remains dominated by donors, with three quarters of our respondents admitting that they have relied on donor funding.

| | |
|--|--------------------------------|
| Number of active D4Ag solutions (2022) | 666 |
| Number of active D4Ag solutions (2018) | 452 |
| Most commonly observed use case | Market Linkages & Access (35%) |
| Median number of users per solution | 60,000 (N=86) |
| Proportion of innovators breaking even | 39% |

Table 28. D4Ag Reach and Adoption in sub-Saharan Africa
Source: Beanstalk Kils and D4Ag Innovators Surveys, 2023



Source: Feed the Future Flickr. Photo credit: Benjamin Drummond

66 AgFunder Africa AgriFoodTech Investment Report 2023. (Only D4Ag solutions included in the number)

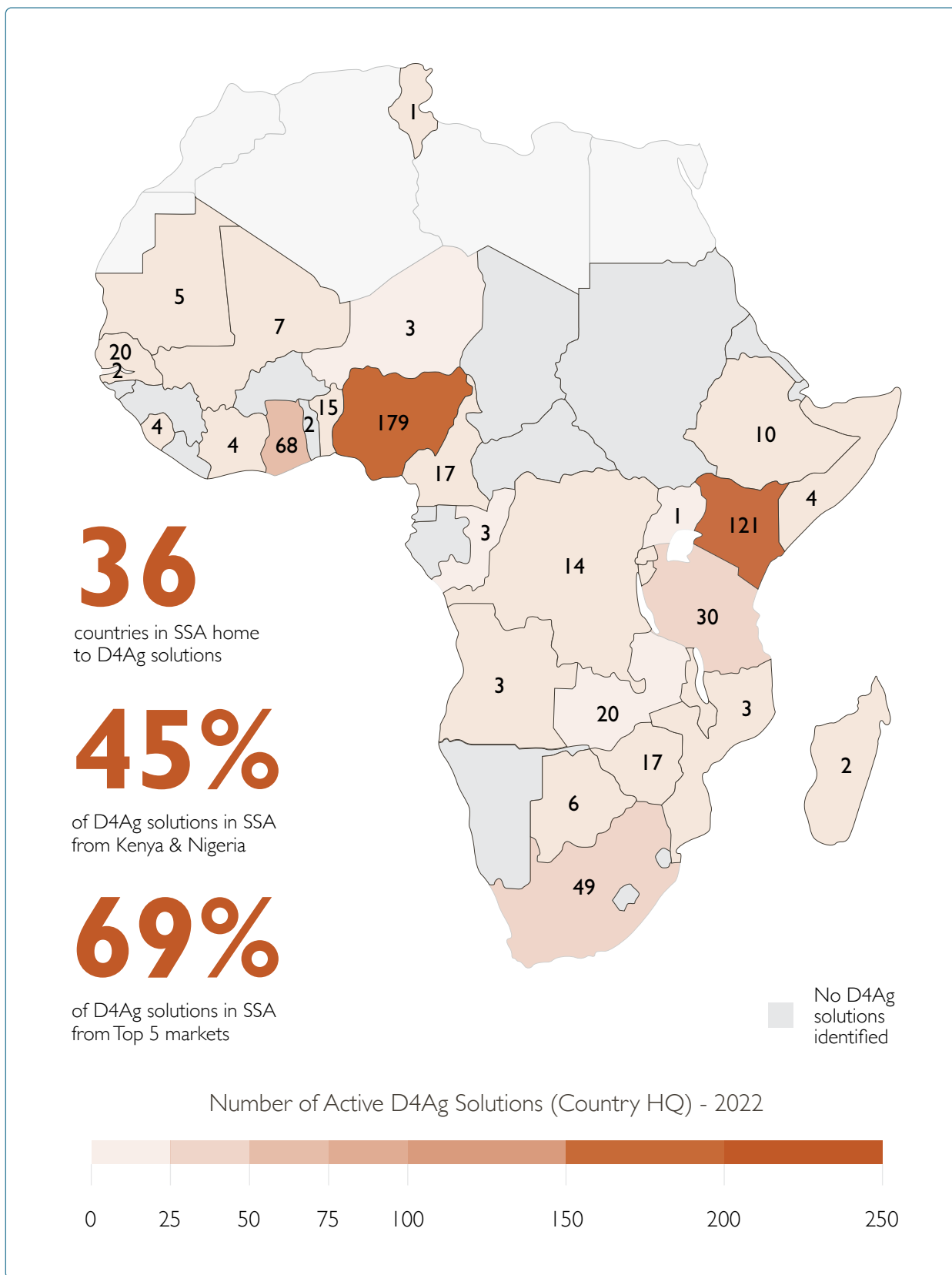


Figure 60. Number of Active D4Ag Solutions, by Country HQ in sub-Saharan Africa, 2022

Despite only 20% of startups expanding operations out of their home country, this is a larger proportion than in South Asia or Latin America, where less than 8% operate in multiple countries.

As of 2022, 56% of innovators focus on either ‘Market Linkages’ or providing ‘Advisory and Information’ services. There’s also a clear trend toward bundling of service offerings, with almost 40% of D4Ag innovators now offering more than one service.

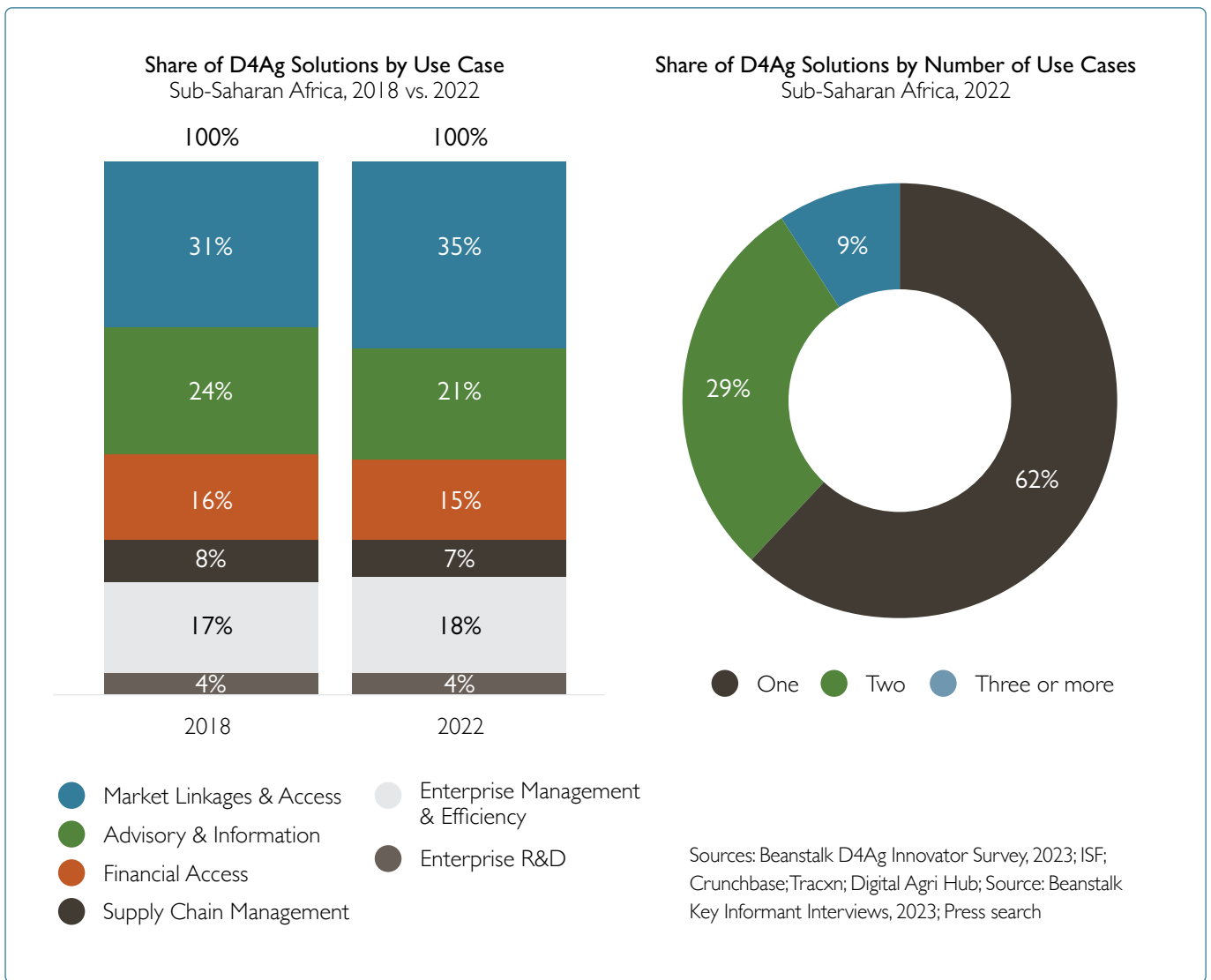


Figure 61. Mix of Use Cases Across D4Ag Solutions (SSA, % of Total)

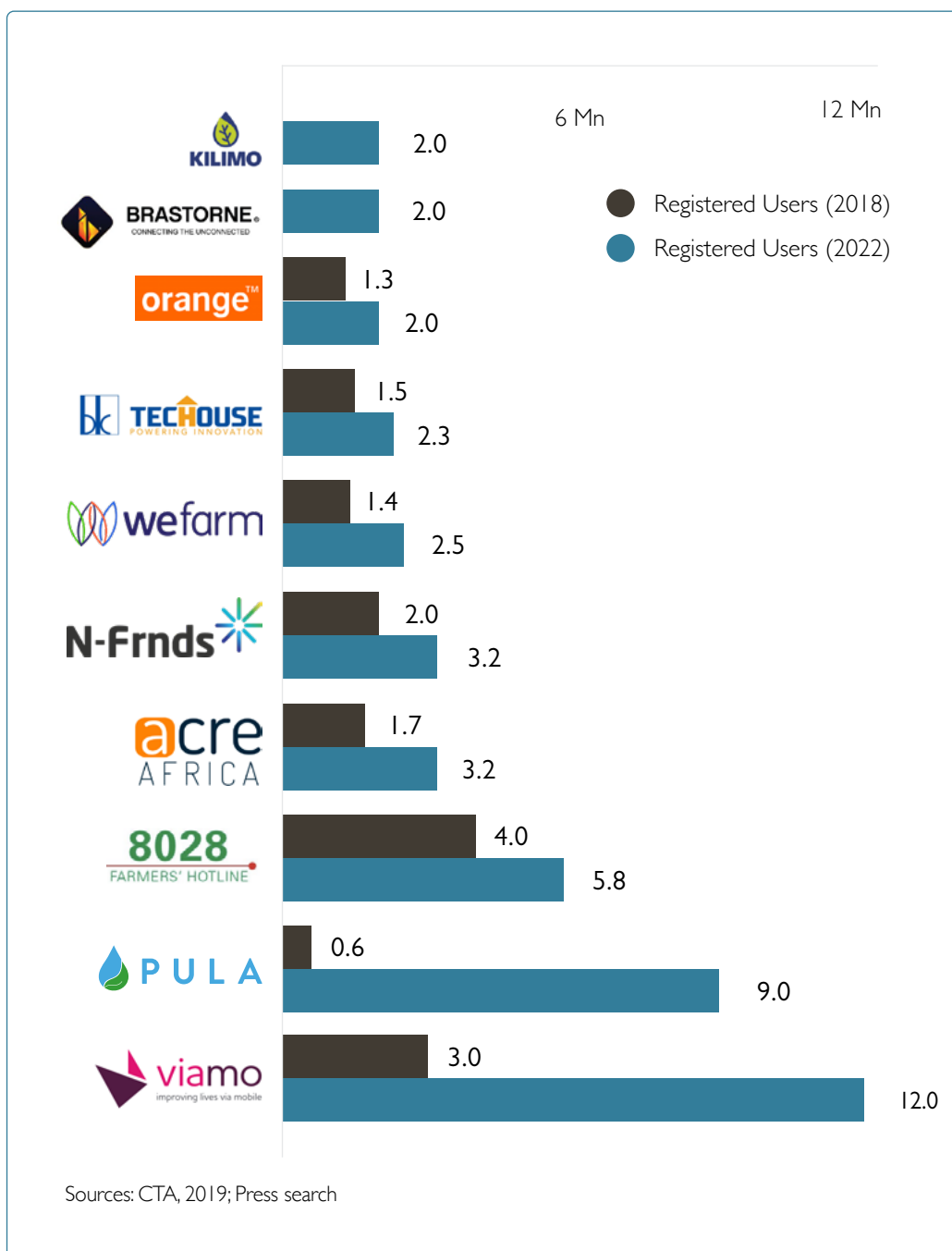























Figure 62. Registered Users of Top 10 D4Ag Solution Providers, SSA.

Regarding user adoption, there has been substantial growth over the past five years. In 2022, **27 solutions reached the 1 million user mark, up from just 11 in 2018.** Even newer innovators are experiencing significant growth in their user base: the majority of D4Ag innovators now have between 1,000 and 50,000 users, with a median number of registered users per solution standing at 60,000 smallholder farmers.

Investment landscape in sub-Saharan Africa is very nascent in comparison to other LMICs: the region

has attracted the lowest level of VC investments across LMICs, despite being home to a sixth of the population. Access to funding was the second most referenced barrier that D4Ag innovators are facing in the region, after access to skilled talent: **39% of innovators admitted facing lack of access to investments.** Nevertheless, few standout startups have raised substantial capital and expanded into different markets: **ten solutions managed to raise over US\$10 million each in total funding from private investors.**

| | Solution Name | Total Funding (US\$, Mn) | Stage | HQ Country | Operations |
|----|--------------------|--------------------------|----------|---|---|
| 1 | Twiga Foods | \$ 157.1 | Series C |  |   |
| 2 | Apollo Agriculture | \$ 61.7 | Series B |  |  |
| 3 | Thrive Agric | \$ 60 | Debt |  |  |
| 4 | Komaza | \$ 58.6 | Series B |  |  |
| 5 | SunCulture | \$ 37.3 | Debt |  |  |
| 6 | WeFarm (shut down) | \$ 32.0 | Series A |  | |
| 7 | Aerobotics | \$ 26.8 | Series B |  |  +17 |
| 8 | iProcure | \$ 16.8 | Debt |  |   |
| 9 | Farmerline | \$ 15.2 | Seed |  |  +4 |
| 10 | Pula Advisors | \$ 10 | Series A |  |  +8 |

Source: Crunchbase

Table 29. Top 10 Solutions by Total Amount of Private Funds Raised, 2022, sub-Saharan Africa, (US\$, Mn).

Interestingly, the leaders in terms of number of users are usually not among the fundraising champions: only **Pula** and now out-of-business **WeFarm** have made it to both top-10 lists, showing that, while user numbers are an important metric, they do not always correlate with fundraising success.

ENGAGING YOUTH IN D4AG IN SUB-SAHARAN AFRICA

Special attention in sub-Saharan Africa has been brought to the engagement of youth in D4Ag, as the region is home to the world's youngest population with 2 out of 3 inhabitants of SSA

being under the age of 30. This expanding youth population presents both an opportunity and a challenge: on the one hand, it signifies a dynamic and vibrant workforce that, while on the other hand, creates a potential for escalated unemployment and social instability.

The whole agricultural value chain, from production to processing, marketing, and consumption, offers a plethora of opportunities for young people, who can effectively utilize digital tools for various agricultural activities, from accessing weather data, managing farms, **linking with markets, to utilizing financial services.** D4Ag can create

significant employment and entrepreneurship opportunities for youth, besides just farming, in areas such as software development, data analytics, drone operation, or digital extension services.

We have observed an emerging trend in sub-Saharan Africa where innovators like **E-Vuna**, **MyAgro**, and others are focusing on equipping young individuals to act as ‘village-based advisors’. This concept involves empowering the youth with the necessary skills and tools to provide various digital agriculture services within their communities. Not only does this model provide the youth with an avenue for employment and entrepreneurship, but it also positions them as key contributors to their communities’ agricultural development. Engaging in these advisory roles does not necessarily exclude the possibility of these young individuals participating in farming activities, in fact, combining these roles can enhance their understanding of practical farming challenges and allow them to offer more relevant and pragmatic advice. By fully embracing this model, innovators not only create an attractive and meaningful livelihood option for the youth

but also foster a community-driven approach to advancing digital agriculture.

BUILDING CLIMATE CHANGE ADAPTATION & RESILIENCE IN SUB-SAHARAN AFRICA

Climate-smart D4Ag is of immense importance to sub-Saharan Africa, a region particularly vulnerable to climate change. Especially relevant is the threat of recurrent and severe droughts that put strain on water resources and undermine agricultural productivity. In this context, D4Ag holds immense promise for improved irrigation management and drought mitigation. However, the usual barriers such as limited digital literacy, inadequate infrastructure, and high costs of technology hamper the reach of climate-smart digital technologies in the region and the adoption remains very low. Nevertheless, SSA has seen a surge in innovative startups employing digital tools for climate-smart agriculture, specifically focusing on mitigating drought impacts and optimizing irrigation.



Source: Feed the Future Flickr. Photo credit: Imran Abdullahi




Ignitia is a social enterprise that provides hyper-local weather forecasts via SMS to small-scale farmers in West Africa. Using proprietary algorithms designed for the tropics, Ignitia’s forecasts help farmers make critical decisions—like when to plant, irrigate, or harvest—to improve crop yields and reduce loss, contributing to enhanced climate resilience.




SunCulture has developed the RainMaker2 solar-powered irrigation system, which combines cost-effective solar pumping technology with a high-efficiency drip irrigation system. Their product enables farmers to grow high-quality produce all year round, and their “Pay-As-You-Grow” platform makes the technology accessible to even smallholder farmers. This improves farm productivity, income, and aids in the adoption of climate-smart practices.




Tolbi has developed a real-time digital decision-making platform that includes mobile agriculture and digital profiling of farmers for proper campaign management, irrigation water and fertilization control, and remote farming practices. Their platform offers localized advisory, AI-based plant disease management, yield forecasts and water needs analysis.




AgriPredict offers a digital platform that provides farmers with various services, including disease and pest identification, weather forecasts, and market information. Notably, it uses AI to predict the likelihood of pest invasions or disease outbreaks, helping farmers preemptively mitigate these risks and thus bolstering their climate resilience.

Figure 63. Sub-Saharan African Climate-Smart D4Ag Innovators

FUTURE OUTLOOKS

The unfolding decade presents both challenges and opportunities for the D4Ag sector. As the world grapples with rapid technological advances, climate change, and evolving socio-

economic dynamics, the D4Ag stands poised to play a transformative role, especially in LMICs. To capture this potential, we have meticulously analyzed and projected the future course of the sector and its impact across three impact vectors: economic, social, and environmental.

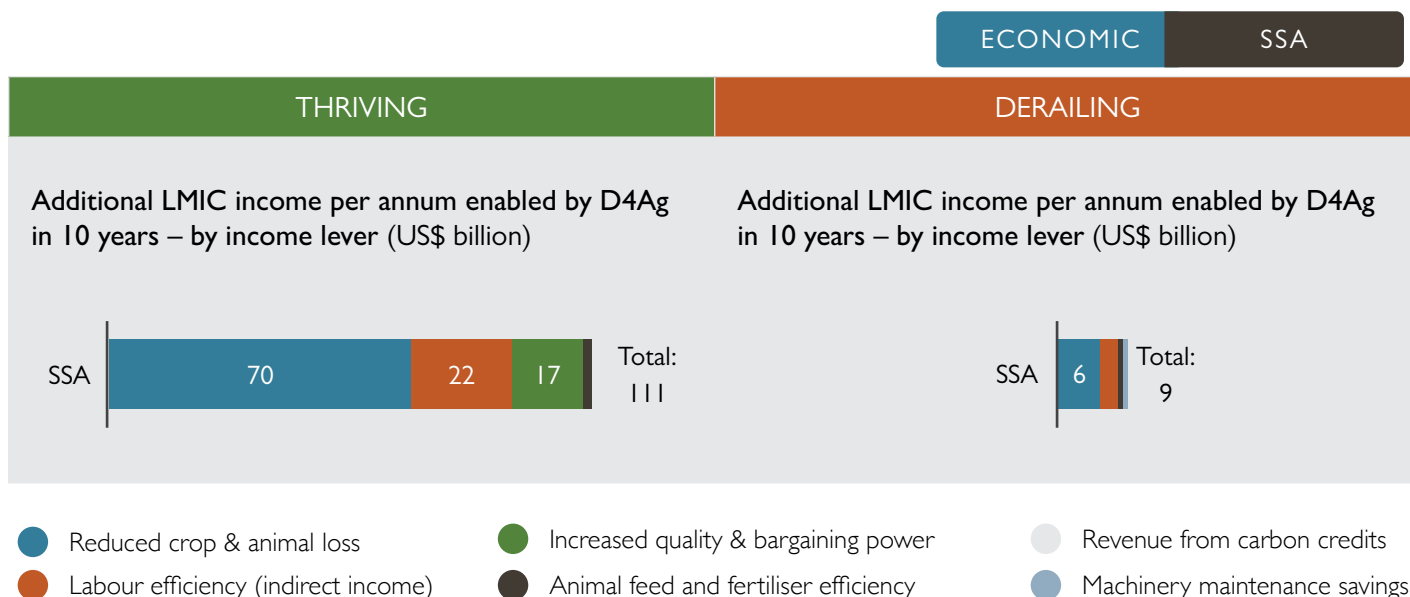
| | Economic Projections (Additional LMIC income per annum enabled by D4Ag) | Social Projections (% of potential user base actively using D4Ag) | Environmental Projections (D4Ag-enabled farm-gate GHG change per annum) |
|--------------------|--|--|--|
| Thriving Scenario | US\$111 billion | 25% | -62 CO2eq megatons |
| Derailing Scenario | US\$9 billion | 11% | +70 CO2eq megatons |

Table 30. 10-Years Outlook for the Sector: Sub-Saharan Africa

Economic Projections:

In the “thriving” scenario, sub-Saharan Africa is projected to generate an additional income of US\$111 billion enabled by D4Ag over the next

decade. In the “derailing” scenario, the region may only witness less than 10% of the potential additional income.



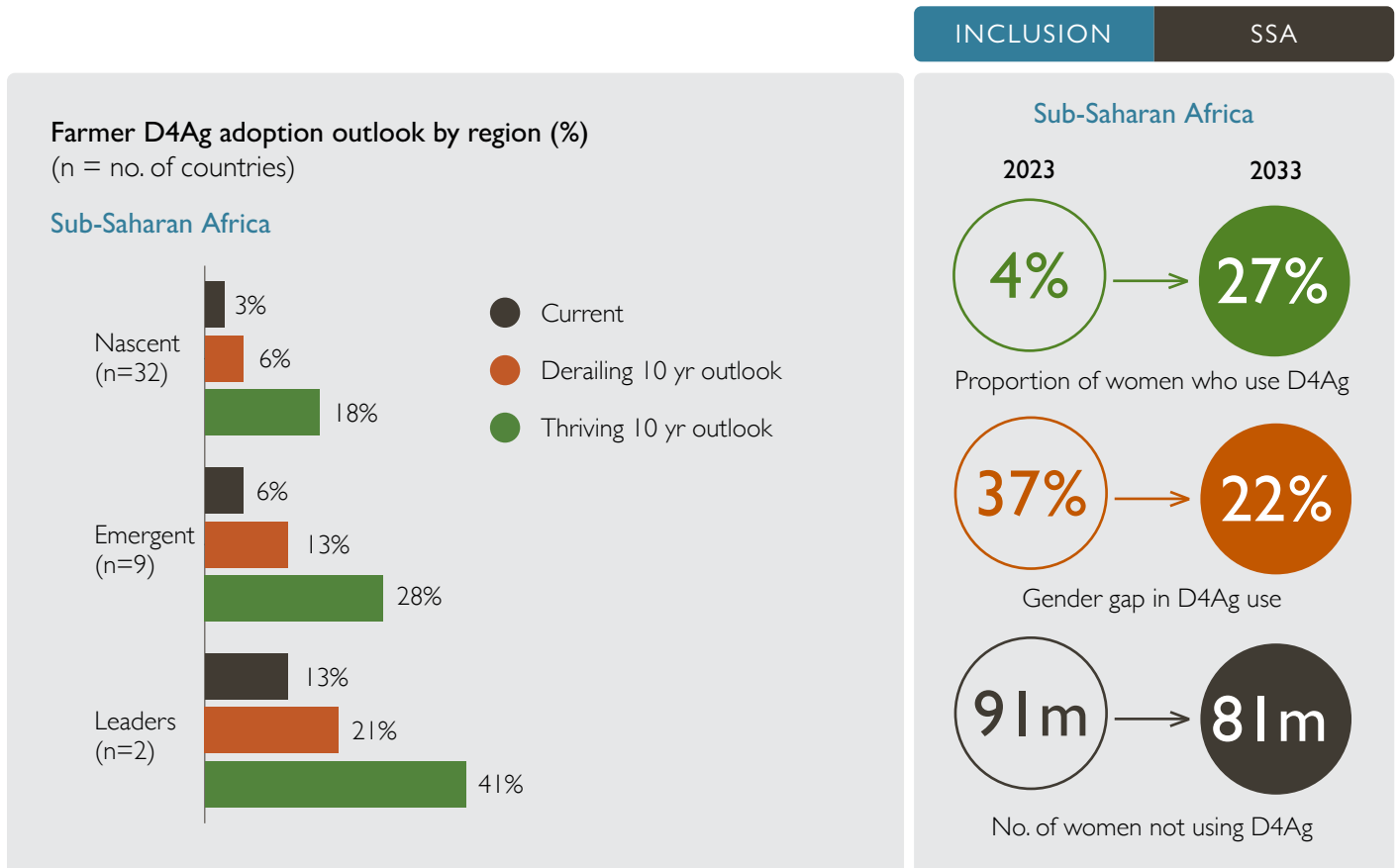
Source: USDA ERS International Agricultural Productivity indices, Beanstalk analysis

Figure 64. Economic Projections Sub-Saharan Africa

Social Projections:

Currently D4Ag adoption stands at an average of 5% in sub-Saharan Africa. The level of adoption varies within sub-Saharan Africa, depending on the maturity of D4Ag ecosystems. By the end of the decade, regional leaders like Kenya and Nigeria could see an

uptake of 41%, if they thrive. The potential benefits might also extend to ‘Nascent’ countries, with up to 20% of their farmers adopting D4Ag solutions. Moreover, the ‘thriving’ scenario could lead to 1 in 3 females in agriculture using D4Ag tools, reducing the gender gap by half.



Note: Available data was extremely limited. Available country data was extrapolated to represent the entire progression status per region. Where data was not available, the 2016 Digital Adoption Index (DAI) was utilized to estimate current adoption levels. The thriving scenario was projected by using the internet adoption curves of each country with an adjustment factor: Relative to internet adoption, the following lag was assumed for D4Ag adoption: Leaders – 10-year lag, Emergent – 12-year lag, Nascent – 15-year lag.

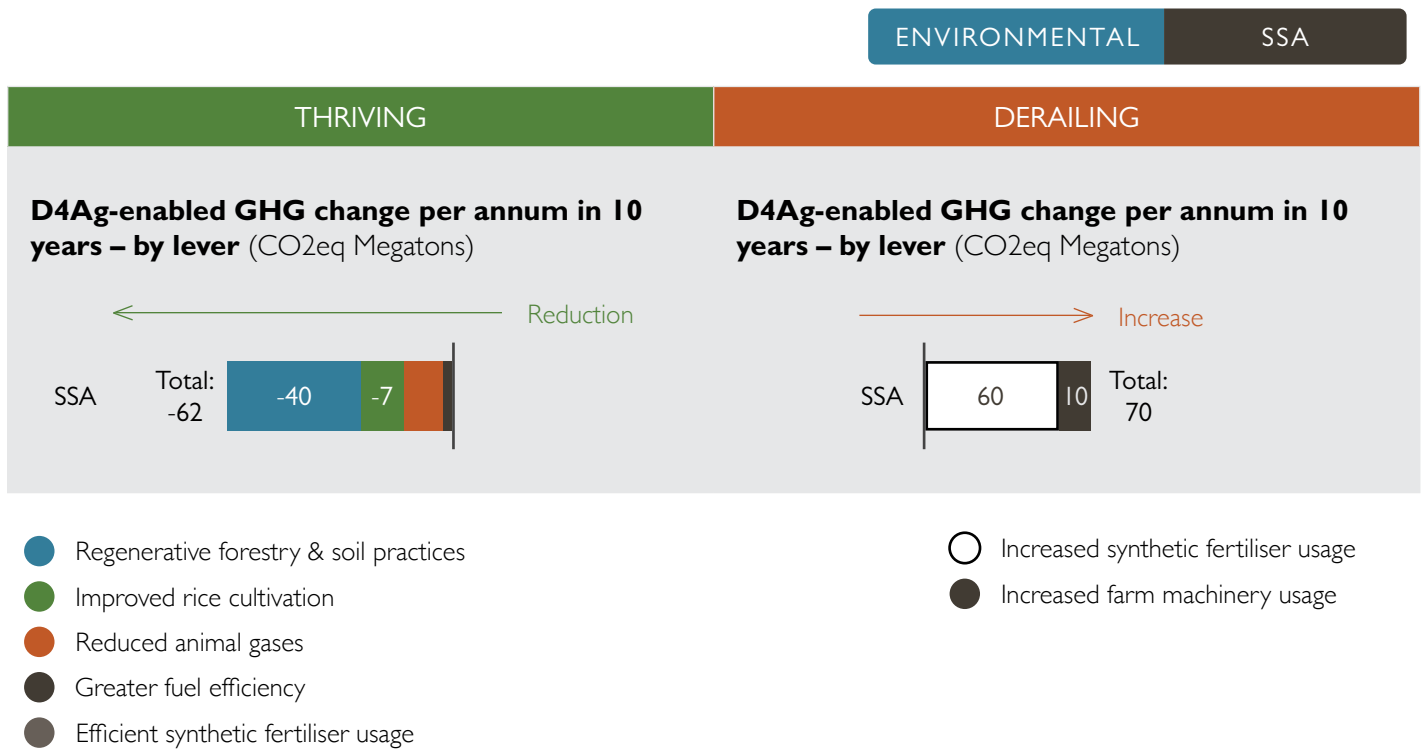
Source: Various, World Bank World Development Indicators (Individuals using the Internet (% of population)), Beanstalk analysis

Figure 65. Social Projections Sub-Saharan Africa

Environmental Projections:

In a thriving ecosystem, regenerative forestry and soil practices are key drivers for environmental impact in sub-Saharan Africa, contributing to 40 out of 60 CO₂eq Megatons decrease in annual GHG emissions. Conversely, in a

‘derailing’ scenario, the region could experience an increase in GHG emissions (71 Megatonnes CO₂eq), predominantly due to increased synthetic fertilizer usage.



Source: FAOSTAT domain Emissions Totals (last updated 22 May 2023), Beanstalk analysis

Figure 66. Environmental Projections Sub-Saharan Africa