



THE FUTURE OF AFRICA'S AGRICULTURE - AN ASSESSMENT OF THE ROLE OF YOUTH AND TECHNOLOGY

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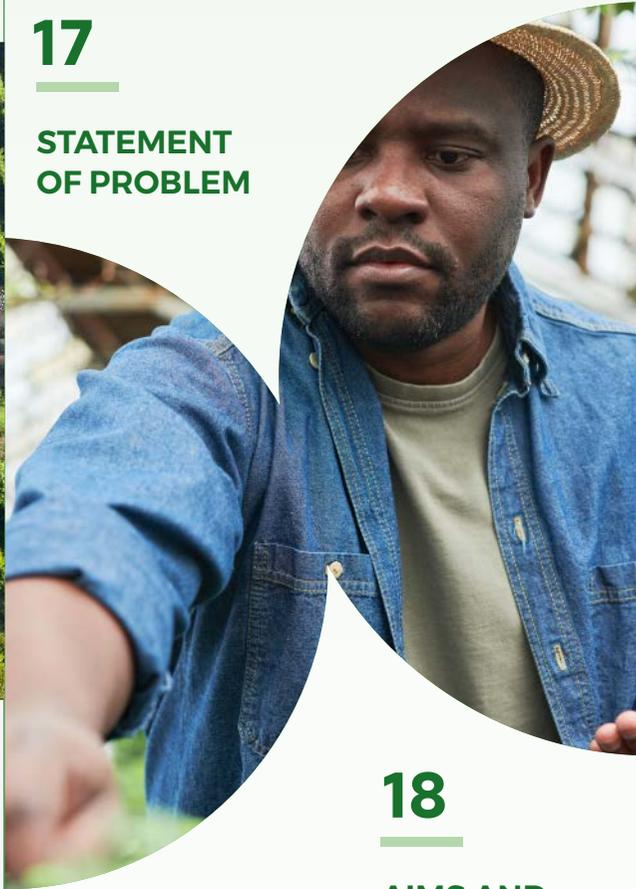
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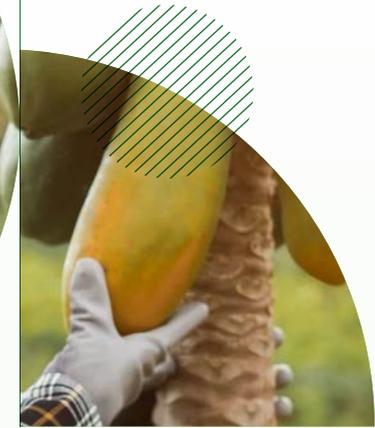
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LIST OF ABBREVIATIONS

AFDB	African Development Bank
AFD	Agence Française de Développement
CCAFS	CGIAR Research Program on Climate Change
CGAP	Consultative Group to Assist the Poor
CIA	Central Intelligence Agency
FAO	Food and Agriculture Organisations
GDP	Gross Domestic Product
ILO	International Labour Organisation
IFAD	International Fund for Agricultural Development
NPC	National Population Council
OEC	Observatory of Economic Complexity
PWC	PricewaterhouseCoopers
SNV	Netherlands Development Organisation
SMS	Short Message Service
UN	United Nations
UNDP	United Nations Development Programme
WFP	World Food Programme





01

EXECUTIVE SUMMARY



70%

OF THE POPULATION IN ETHIOPIA WORKS IN AGRICULTURE AND IT IS THE BACKBONE OF THE ECONOMY

52%

OF GHANA'S POPULATION IS EMPLOYED IN AGRICULTURE

20%

OF ZAMBIA'S GDP IS CONTRIBUTED BY AGRICULTURE, AND IT EMPLOYS 54.8% OF THE POPULATION

AGRICULTURE CONTRIBUTES HEAVILY TO THE GDP OF MANY AFRICAN COUNTRIES AND IT EMPLOYS MORE THAN HALF OF THE RURAL POPULATION ACROSS THE CONTINENT. IN PLACES LIKE GHANA, ETHIOPIA, KENYA, MALAWI, AND ZAMBIA, THE CONTRIBUTION OF AGRICULTURE TO THE ECONOMY HAS CREATED SOME POSITIVE ECONOMIC GROWTH.

In Ethiopia for instance, Agriculture is the backbone of the economy as it employs over 70% of the population. In Ghana, agriculture employs 52% of the workforce and accounts for 17% of the GDP. In Zambia, agriculture contributes 20% of the GDP and employs 54.8% of the population. This contribution is evident across many African countries. Despite the positive effect of agriculture across the continent, the sector remains unattractive to young people. Many young Africans move to the urban areas and have no interest in taking up agriculture as a source of livelihood.

The rural population comprising mostly smallholder farmers practices subsistence farming, and for many, there is a lot of uncertainty that comes with farming. Issues like climate change, lack of technology, illiteracy, and access to opportunities pose a great threat to their source of income.

Many of these farmers, despite their years of farming experience, are faced with the problem of low productivity caused by a combination of adverse climatic conditions and harmful farm practices. Even though smallholder farmers are faced with the problem of low productivity, they have found it difficult to adopt the technology that will help them scale their farms and remove the uncertainty attached to their means of livelihood.

TECHNOLOGY IS REVOLUTIONIZING EVERY SECTOR ACROSS THE GLOBE, AND THE AGRICULTURE SECTOR IS NO DIFFERENT. THERE ARE NEW INVENTIONS IN THE SECTOR THAT HAVE THE POTENTIAL TO INCREASE AGRICULTURE PRODUCTIVITY ON THE CONTINENT.

Innovators have begun to rely on technology such as artificial intelligence, remote sensing, geographic information softwares, virtual reality, drone technology, application programming interface technology and precision technology to provide an accurate measure of rainfall, pest control, soil information, soil productivity, and farm size and productivity potential. In Africa, there have been innovations to help farmers produce and earn more. Startups like ThriveAgric in Nigeria, Grainpulse in Uganda, Agrocenta in Ghana and Agriprofocus in Tanzania are using technology to improve the capacity of the agriculture sector in Africa. Despite this potential of technology to change Africa's agriculture sector, smallholder farmers are faced with the challenge of incorporating technology in their agricultural practices.

To fully understand the perception of stakeholders towards these problems, a research study was carried out to survey youths, smallholder farmers and agriculture technology organisations in 11 countries. The goal was to understand the lack of interest in agriculture among the youth, the reasons behind low productivity and low technology adoption among smallholder farmers, the barriers to technology adoption and the innovation in agriculture on the continent. This study surveyed these stakeholders in addition to conducting desktop research on the eleven countries in focus.

The research suggests that efforts geared towards providing financial capital, capacity building and access to land will spur the youths' interest in agriculture. Smallholder farmers will embrace technology if their capacity is developed and

there is affordability in the cost to adopting technology. Innovation in agriculture will act as a pulling power for every stakeholder in the agriculture sector as it will create opportunities for young people to participate more, increase productivity for smallholder farmers and create a positive economic climate that will benefit businesses greatly.

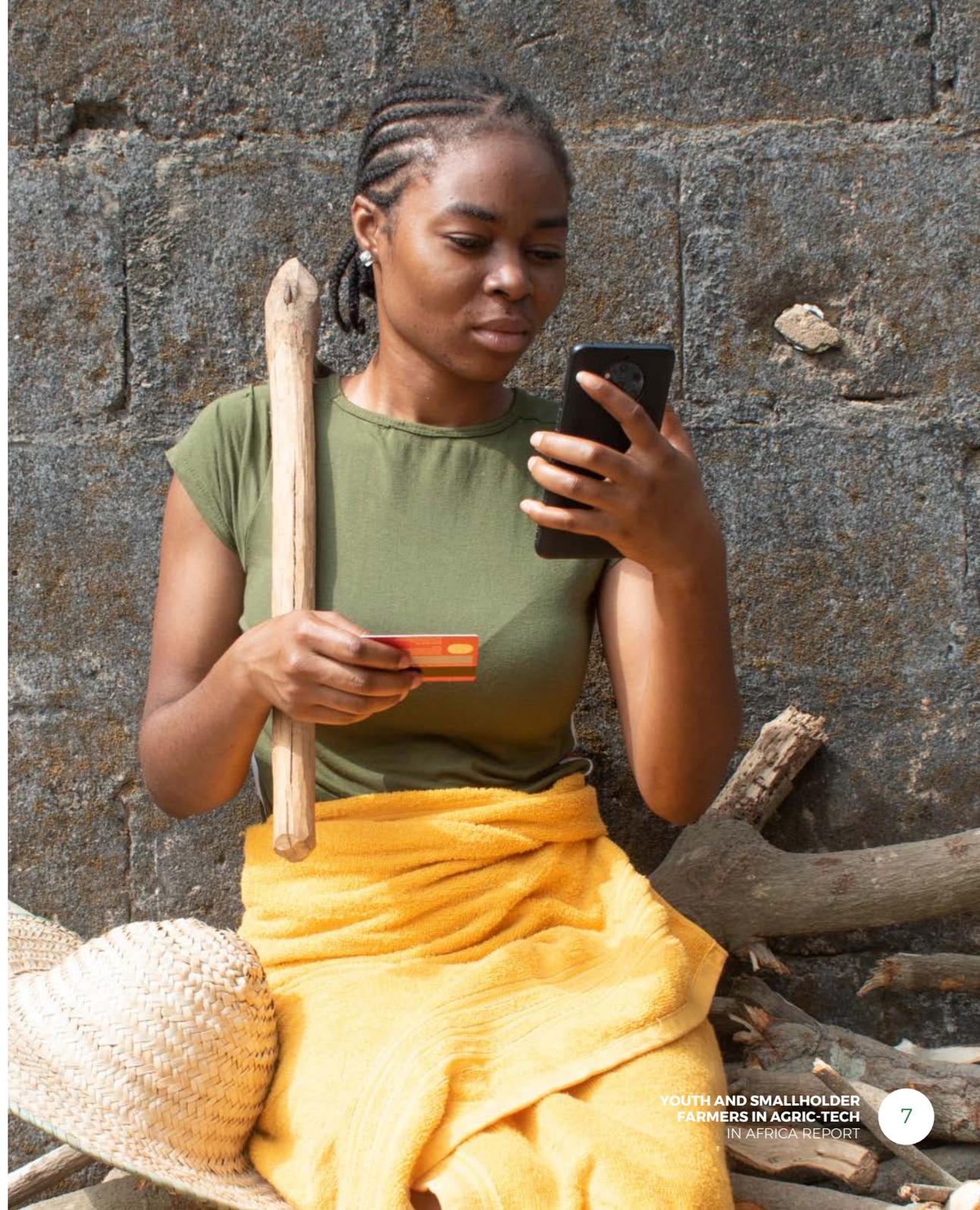


Perception Of African Youth Towards Agriculture

Youth are a vibrant demographic, and in many countries they make up the largest number in terms of population. Many are unemployed or underemployed, and there is a shift to urban migration because of lack of opportunities in rural areas. Their perception towards agriculture suggests that lack of funding is the biggest barrier towards their interest in the sector. There is also the need to increase their capacity as many do not have the required knowledge or skills to take advantage of the potential of the agriculture sector. Access to technology is another challenge for this group, and innovation in the sector will create change in the perception of youth and transform their mindset about the sector.

Agric-Tech Adoption Among Smallholder Engaged In Agriculture

Many smallholder farmers face the challenge of low-tech adoption and this creates a circle of low agricultural productivity, hampering their ability to innovate to produce more. Low technology adoption is also noticeable among young farmers as short messaging service (SMS) technology accounts for the only type of technology employed on farms. The solution to this is education that relies on introducing farmers to technology and its potential application in the agriculture sector. Education on innovation in agriculture and its effects on yields and income will motivate farmers to adopt technology in their farming. Affordability and ease of use of technology is a key factor to consider due to the socioeconomic and literacy conditions of the farmers.



Innovation In Agriculture

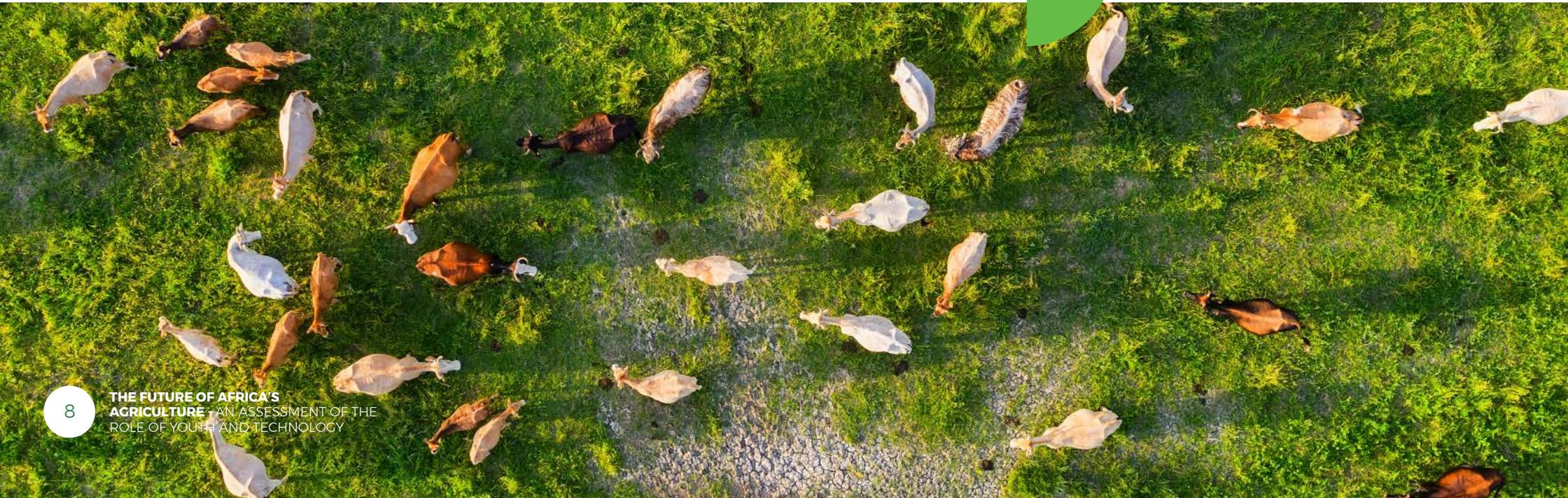
Technological innovations have helped smallholder farmers solve many agriculture related issues. The impact of technology is evident in terms of providing information about weather and climate, input supply, smart farming technology and information services. Other areas where technology has impacted farmers include digital finance, precision farming tools, storage technology and agriculture ecommerce. Although these areas are still in their infant stages of impact, the farmers have evidence of its usability and potential. Innovation in agriculture will be embraced through a combination of education, information access, and capital. Strong linkages have to be developed between the smallholder farmers, agric-tech startups, research institutes, international funders, youth and governments for a greater impact of innovation on the sector.

Critical Success Factor Of Technology Solution In The Agriculture Sector

Development of technology and innovative solutions in agriculture will attain a step towards continental popularity if bottlenecks facing business and youth stakeholders can be addressed. Access to capital, human resource/employment, working capital and regulatory and policy environments have to be addressed to encourage businesses and young people to develop innovative solutions for the agriculture sector. Solutions developed after bottlenecks have been addressed will be geared towards addressing low productivity, irrigation problems, changing environment, access to finance, access to markets and literacy among farmers. A combination of innovative solutions and empowered smallholder farmers will create a ripple effect on the economy of many African countries.

Business And Education Stakeholders Are Vital For Agriculture Revamp

These stakeholders such as agribusinesses, agric-tech startups, agriculture research institutes, innovation hubs, agriculture-focused non-profits and indigenous private enterprises will create a development pathway for smallholder farmers and youths. These organisations are part of vital networks of farmers on the continent, and are the first step towards introducing any technology or innovation to the farmers. Due to their track record, confidence and trust has been developed and they serve as the ears and eyes of many smallholder farmers. Trust is vital towards encouraging smallholder farmers to adopt new technology, and the business and education stakeholders have gained the trust of farmers as a result of years of working in the local communities.



RECOMMENDATIONS

FOOD INSECURITY IN THE CONTINENT CONTINUES TO GROW AT A DISTURBING RATE. SMALLHOLDER FARMERS ON THE CONTINENT HAVE LIMITED ACCESS TO IMPROVED FARMING TECHNIQUES, MARKETS, AND INPUTS. AFRICA'S YOUNG POPULATION IS A KEY DETERMINANT IN SUPPORTING THE FOOD SECURITY ISSUES THE CONTINENT FACES. THIS RESEARCH CLEARLY SHOWS THAT YOUNG PEOPLE HAVE A KEEN INTEREST IN AGRICULTURE, UNDERSTAND THE IMPORTANCE OF TECHNOLOGY AND ARE CONSIDERING WORKING IN THE SECTOR.

The challenges and barriers they face are herculean, from lack of access to land, adequate skills set, sustainable financing and access to markets that ensure a fair price. The recommendations proffered are not exhaustive and consider existing programmes by Heifer International.

A review of existing programmes targeted at smallholder farmers and youths must be conducted to determine if the current strategies support the African farmer with the use of technology. Innovation must be viewed within the context of the current realities.

Beyond a smart app, providing linkages to local and regional markets will go a long way in improving the financial bottom-line of every farmer.

Digital literacy must be a key consideration. Smallholder farmers in rural areas will not have access to smartphones or internet access. However a basic phone is a good starting point in introducing the use of technology, through weekly SMS on prevailing market prices and best input bargains.

Youths with a keen interest in agric-tech must work collaboratively with smallholder farmers to get a better understanding of their challenges and how to provide sustainable and affordable solutions. There is a need to capture data to provide evidence-based results on the immediate benefit and long term impact of the use of technology by smallholder farmers.

The importance of training and mentoring programmes was strongly echoed. The importance of hand-holding young farmers is critical to their success. Training programmes must include exchange programmes, internships, and mentoring. Mentors with agriculture and business start-up experience must be engaged to support youth programmes in a structured and measurable manner.

Stakeholder engagement with governments to provide access to land, tax waivers and fiscal policies that deliberately support youths in the sector should be a component of every programme. Youths who took part in the focus group discussions stressed their lack of access to markets to sell their produce.

The importance of creating a bespoke-country specific marketplace, both virtual and physical where farmers and off takers can connect is important.

Online branding and marketing communications are key. Establishing a digital presence on social media in order to aid marketing across various locations is an important step which can support product sales.

Access to opportunities which drives innovation is key in motivating youths' involvement in Agric-Tech. Sustainable opportunities such as competitions which reward participants with the means to carry technological innovations are important for youths interested in agric-tech and smallholder farmers. This research emphasises the need for in-depth data collection on smallholder farmers in Africa. This will aid evidence-based innovation localised for their use. Creating an agric-tech solution in itself is an end to a means, but a careful process test-run before full adoption is quite important.

Innovation in agriculture will drive growth in African countries. Encouraging innovation by supporting programmes geared towards accelerating agric-tech startups, youth-owned agriculture businesses, and other business stakeholders along the agriculture value chain will serve as a catalyst for economic development in Africa.

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INTRODUCTION

AGRICULTURE IN AFRICA

Agriculture is a major mainstay in Africa. Over the years, the continent's socio-economic boost has been focused on agriculture. About 23% of the gross domestic product of sub-Saharan Africa comes from agriculture¹, and the figure stands at 32% for the continent. The agricultural sector accounts for the high employment of almost two-thirds of citizens in Africa. Despite the growth of agriculture, there are still untapped and uncultivated aspects of agriculture in Africa. The continent still falls among poor nations in agriculture despite having about 60% of uncultivated farmland. Large swaths of land remain undeveloped with low productivity compared to the rest of the world².



1 McKinsey & Company, 2019. <https://www.mckinsey.com/industries/agriculture/our-insights/winning-in-africas-agricultural-market>

2 FAO 2017. <http://www.fao.org/family-farming/detail/en/c/1028928>



The use of tech and information has improved decision making in my recently (July 2020) established cocoa farm specifically in areas of nursery, planting date, soil moisture conservation and period of pest (termite) infestations.

Philip Kwofie

Smallholder farmer - Ghana



Africa's focus on specific aspects of agriculture remains a major problem facing the agricultural sector. Agricultural practices throughout African countries differ. These practices differ due to disparities in climatic and environmental conditions, for example. Agricultural practices in dry regions of North Africa differ significantly from practices in tropical rain forests of Central Africa. The cultural conditions of each country in Africa also affects agricultural practices. Agricultural practices in Africa range from crop farming to livestock farming. Peasant and subsistence farming are the basic form of agriculture in most parts of the continent. Commercial farming in Africa has not grown as much as subsistence farming has developed over time in this region.

Lots of factors accumulate to hinder the growth of agriculture in Africa. In Africa, most aspects of agriculture still depend largely on rainfall for farming, and the effects of climate change and are threatening the benefits the continent can reap from agriculture. Only about 6% of lands practice irrigation farming as compared to other developing agricultural nations in Asia³. This high dependence on rainfall agriculture results in low output.

ACCORDING TO AN OXFORD BUSINESS GROUP REPORT, AFRICA STANDS A CHANCE TO ERADICATE FOOD POVERTY AND DEVELOP ECONOMIES THROUGH AGRICULTURE BUT NOT WITHOUT SOLVING THE PROBLEMS FACING ITS AGRICULTURAL SECTOR⁴.

Factors like poor governance, lack of investment, low use of fertilizers, better seed type, low use of mechanized farming all contribute to the lower rate of agricultural productivity in Africa. In comparison to other developing nations and as a continent with the largest expanse of uncultivated land, the prospects of agriculture eradicating poverty, ensuring food security, and providing job opportunities is lower than possible.

Sub-Saharan Africa majorly has faced numerous challenges in its agricultural sector in the past decades. They include accelerated population growth, climate change, increased urbanisation,

3 Africa Agriculture Statistics Report, 2018.<http://agra.org/wp-content/uploads/2018/10/AASR-2018>

4 Oxford Business Group, 2019.<https://oxfordbusinessgroup.com/blogs/souhir-mzali/focus-reports/agriculture-africa-2019-special-report>

and chronic food insecurity. Commendable efforts have been made to bring about changes in these areas over the years. Among these efforts is the Malabo Declaration of 2014 where decisions were made to direct concerted efforts to achieve accelerated agricultural growth and transformation.

An increase in agricultural productivity will likewise help most Africans maintain a better livelihood as food insecurity and poverty would be tackled⁵.

Other laudable efforts can be noticed with the commitment of the African Heads of State and Governments to provide means of tapping into agriculture to end hunger, reduce post-harvest losses, and enhance nutrition by 2025⁶.

Despite all the efforts to ensure that agriculture has a good standing in Africa, little or no progress has been recorded in the labour and land production factors. Focus is based on non-mechanized farming and the use of a large labor force which do not generate reckonable change. Similarly, population growth has further hampered all efforts to achieve the best in the African agricultural sector. In both urban and rural areas,

over the past thirty years, the nations of the continent have experienced steady population increase. The effect of this is that more people need to be fed with little output since agriculture in this part of the world is for subsistence rather than exportation. For a continent with booming agricultural practices, exports run low at around 8% of world agricultural export⁷. With foreign investment and external financial flows in the past years, the level of impact is increasing and should soon be noticeable.

The COVID-19 outbreak of 2020 had its toll on the agenda to feed 9 billion by 2025. The pandemic proved that globalization links the world together. Progress of African agricultural activities into modernity will largely fall on their contribution to global food security⁸. Involving modern practices will create a pathway for Africa to curb food insecurity and poverty. More progress can also be achieved with the involvement of the largest group in the population – youth – in all phases of agriculture.

YOUTHS AND AGRICULTURE

Young people under the age of 25 account for about 60% of the African population. According to the UN, there are about 1.8 billion young people between ages 10 to 24 in the world. Out of the estimates, Africa is home to over 200 million of these young people. The rate is increasing and is expected to grow by 2035⁹. These large groups in the population are of working age.

The population growth in Africa is attributed to increasing life expectancy and lower death rates especially among young people¹⁰. The child mortality rate has tremendously decreased and fertility rates among Africans remain high. The result of this is the current youthful population in Africa. With the population rise, job opportunities should also increase. The agriculture sector holds high potential in providing job opportunities for African youths. The potentials and benefits of agriculture remain untapped especially by the younger citizens of the continent.

5 NEPAD 2019, <https://www.nepad.org/caadp/publication/agriculture-africa-transformation-and-outlook>

6 FAO 2016-2017, Africa's commitment to end hunger by 2025, <http://www.fao.org/africa/perspectives/end-hunger/en/>

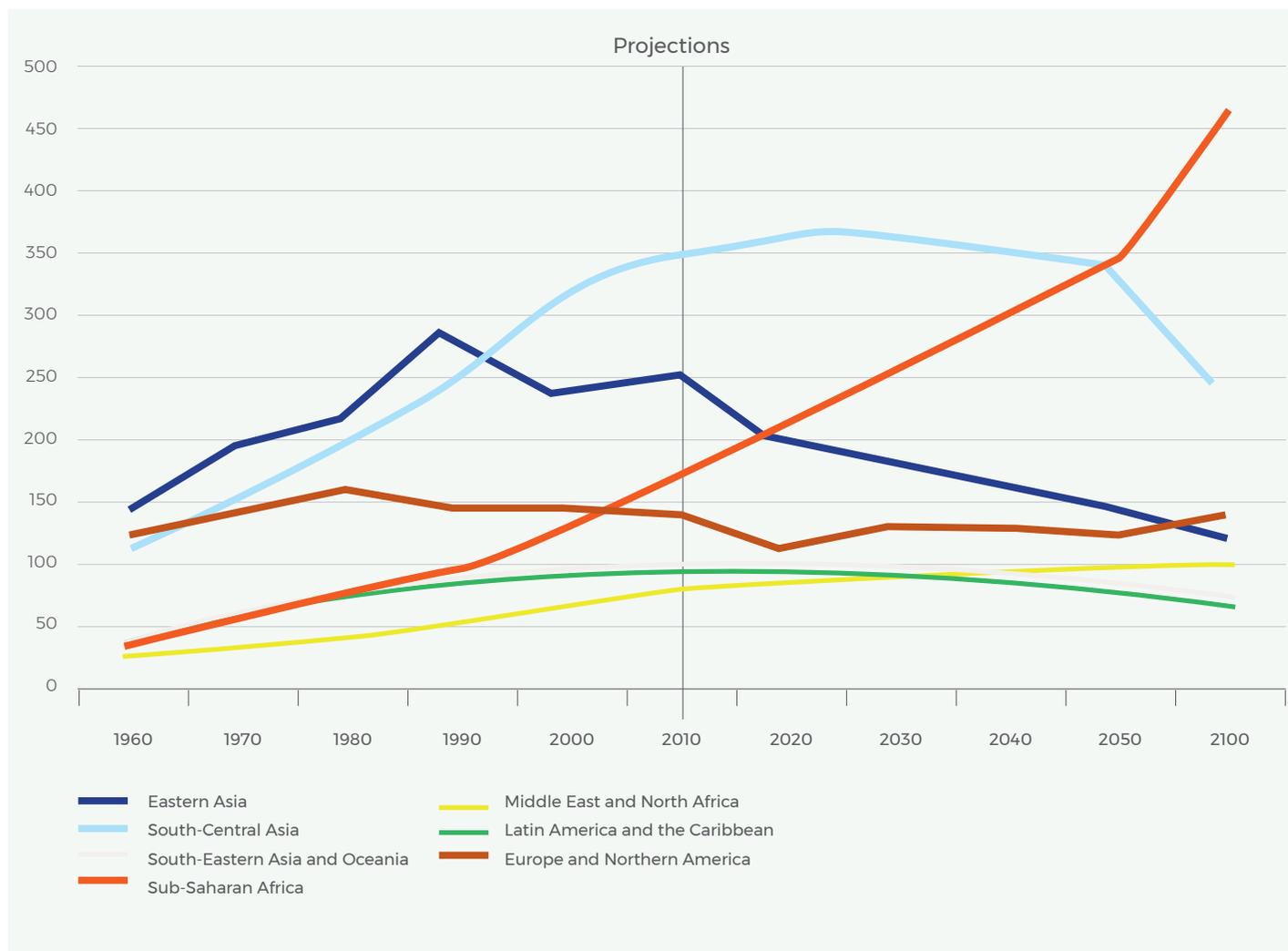
7 Agriculture in Africa, 2017, <https://www.howwemadeitinafrica.com/agriculture-africa-potential-versus-reality/57635/>

8 Solidaridad 2020, <http://www.solidaridadnetwork.org/news/preparing-africas-agriculture-for-the-future/>

9 FAO 2018, <http://www.fao.org/e-agriculture/news/future-africa%E2%80%99s-agriculture-rests-youth>

10 YPARD 2018, <https://yaprd.net/2018-01-31/how-can-african-youth-transform-agricultural-sector>

Projected youth population by region ¹¹



As reported in the International Labour Organisation’s World Employment and Social Outlook in 2016, youth unemployment rates, job insecurity, and poverty are at the peak with little signs of change¹². There is an urgent need for African communities to engage this population for greater agricultural growth. With the rapidly growing population of young people in Africa and increasing youth unemployment rates, agriculture can become a sustainable response to youth unemployment especially as it is inclusive¹³. Agriculture, as an economic mainstay of many African countries, can sufficiently employ the growing majority of unemployed young people as skilled and semi-skilled labour.

The sector opens up great potential for accelerating growth and providing job opportunities for a large youth population. Since the need for food security and domestic and global food demand keeps increasing, agriculture can rise as a valuable employer of labour.

¹¹ Food & Business Knowledge Platform 2015 Youth employment and agriculture in Sub-Saharan Africa

¹² ILO, 2016. <https://www.ilo.org/global/research/global-reports/weso/2016/lang-en/index.htm>

¹³ CCAFS, 2017. <https://ccafs.cgiar.org/news/youth-involvement-agribusiness-examples-africa>



Agriculture is a process. So, if we want agriculture to be instilled in people, it has to start from early childhood.

Bruno Tembo
Education Advisor - Zambia



Agriculture likewise remains a valuable part of economic growth. For African transformation, agriculture is a necessary and realistic option.

AFRICAN LEADERS PLAN TO PROVIDE EMPLOYMENT OPPORTUNITIES FOR A MINIMUM OF 30% OF YOUNG PEOPLE IN THE AGRICULTURAL SECTOR BY 2025.

This promise is laudable until the milestone can be achieved. Several factors are challenging the involvement of young people in agriculture. Most young ones in the continent consider agriculture as the profession of the old. Despite having a median age of 19 years old, the average farmers' age in Africa is 60 years old¹⁴. Most young people regard agriculture as ineffective, socially immobile, and technologically bland. The change to urbanization and urban migration further stresses this point¹⁵.

Besides, those who seem interested find themselves battling with invaluable and existing policy processes. Their economic potentials and contributions to the agricultural sector are hampered by these policies. Lots of young people experience difficulties accessing land, loans, and innovations in agriculture. The question is not just about getting farmlands for youths to farm, but about creating productive opportunities in the agricultural sector for youth involvement.

Agribusiness is a promising solution to solve the unemployment issue facing African youths. By agribusiness, we refer to such ventures that revolve around agriculture. Employment response from agriculture would not only focus on farming but include processing, packaging, transporting, marketing, distribution, and financial services¹⁶.

Recently, some youths are beginning to see the wide benefits of agriculture that go beyond subsistence farming. It has moved from the "old people's occupation" to what young people now find lucrative. Nonetheless, more work is needed. The government in each African country is to depict agribusiness to the youth as a reputable and respected field. Most importantly, the government should create capital backings to the interest of the youths in agriculture. To make agriculture more viable for the young people, government or responsible agribusinesses should provide funding for them.

Other issues that hinder the engagement of young people in agriculture are the low productivity and profitability of the sector. As much as agriculture looks lucrative, it does not provide total productivity. The present state and future of agriculture in Africa will be dependent on the level of innovation geared at the value chain¹⁷. Innovations will come in aspects of new policies and programs that will help young people get a new outlook on agriculture. Governments like Burkina Faso, Ethiopia, and Rwanda who have created the link between agricultural growth and productivity are rapidly reducing poverty in their regions. The growth of agricultural productivity connects to other aspects of the economy.

14 YALI Voices.<https://yali.state.gov/yali-voices-youth-as-catalysts-for-agricultural-transformation-in-africa/>

15 UN Youth Envoy 2016.<https://www.un.org/youthenvoy/2016/04/why-are-rural-youth-leaving-farming/>

16 Kiisah Consulting, 2021. <https://www.kiisahconsulting.com/agricultur-for-african-youth/>

17 Feed the Future, 2017. Engaging African Youth In Agriculture



When we talk of a farmer, the picture we have in mind is a poor man....it is about time that we begin seeing farming, or we begin seeing the farmer as a competent person or someone who can bring money or farming as something that can bring money home

Justice Anertey
Agripreneur - Ghana



Lack of adequate training also stands as a barrier to youth involvement in agriculture. Young people in the rural areas, where we still have the expanse of land, have little or no knowledge of new agricultural technologies and agribusiness¹⁸. Some agricultural agencies in the past years and recently are providing necessary training for young people in Africa. These trainings and support are to enable young people to develop their leadership skills and vital knowledge¹⁹. For instance, The International Institute of Tropical Agriculture's (IITA) Youth Agripreneurs (IYA) trained youths on changing their perception of agriculture. They are trained to view agriculture in their "definition of cool business" and as a profitable business. Other initiatives like the Mali Agribusiness Hub, ENABLE Youth Program, DINFEL, YEAP, and CADER have offered training on different aspects of agriculture to youths in Africa.

Furthermore, as new aspirations are growing in the heart of youths in Africa, the government and private sector can strengthen these aspirations by projecting some efforts of youth agribusiness in Africa, enhancing learning and information, supporting youth agribusiness projects, and investing in youth agribusiness in the rural areas²⁰. The 2017 World Food Prize laureate, Dr. Akinwunmi Adesina, stated that the future of Africa's youth lies in agriculture. However, it may be just a statement, not an act, if there is no involvement of the said group. Involving more youth in agriculture and agribusiness is crucial to help African countries achieve development goals.

All these with necessary major shifts in power dynamics and perceptions²¹.

THE EMERGENCE OF THE AGRIC-TECH SECTOR

Agriculture has been identified as the main driving force for African development and this sector has undergone numerous transformations²². Achieving food security has become a top agenda of governments in Africa as this has been linked to the survival of the developing nations. The United Nations, in recognition of the role food security plays in the sustenance of nations, developed the Sustainable Development Goals (SDGs), whose goal 2 seeks to achieve global food security.

There is a transformation going on in the agricultural sector in Africa. Technology has been at the heart of these transformations and several innovations have emerged to cause a radical change in the Agricultural sector. Innovations have emerged to disrupt the way agriculture is done in Africa to mitigate the numerous problems that the African agricultural sector faces yearly²³. Several innovations that are based on the technological advancement witnessed in the aspect of ICT have been adopted in the agriculture sector to help improve yield and provide a better farming experience for the farmer to achieve food security²⁴.

18 CCAFS, 2017.<https://ccafs.cgiar.org/news/youth-involvement-agribusiness-examples-africa>
 19 SciDevNet 2020.Africa's youth want to cultivate careers, not just crops · Sub-Saharan Africa
 20 MDPI, 2019.<https://www.mdpi.com/2071-1050/11/1/185/pdf>
 21 CCAFS, 2017.<https://ccafs.cgiar.org/news/youth-involvement-agribusiness-examples-africa>
 22 AFDB (AEB), 2017. https://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/AEB_Volume_8Issue_3.pdf
 23 AFDB.<https://www.afdb.org/en/topics-and-sectors/agriculture-agro-industries/bank-group-vision>
 24 Campi, M. 2017. "The Effect of Intellectual Property Rights on Agricultural Productivity." *Agricultural Economics* 48 (3): 327-39.

Technologies such as cloud computing, open-source software, aerial imagery from drones or satellites, improved weather forecast and soil sensors that provide farmers with the correct information to ensure that the yields are improved to meet up with the outlook of the current government projections as regards food production²⁵.



Agritech is the triple N for sustainable development (Nigeria's New Normal).

Tolu Ajayi - Agripreneur - Nigeria



Fuglie, Gautam, Goyal, and Maloney stress the fact that to sustain the growth of agricultural productivity in Africa, farmers are enjoined to become more proactive in adopting the ever-increasing modern farming methods and technologies that help to improve farm yield, provide more efficient input, adopt new and improved crop and production systems, conserve natural resources and improve the quality of their products²⁶.

Several solutions have been developed to address the problems faced by agriculture in Africa. An example is the digitalisation for agriculture (D4Ag solution) which has been thought to be a game-changer on the African scene for the transformation and acceleration of agriculture across Africa²⁷. The D4Ag solutions offer farmers access to information that allows them to achieve a variety of goals by providing information on how farmers can optimize their production process, access products and services and explore new markets. All of these are provided by the fact that the D4Ag solution collects and analyzes data to forecast farming and market trends that are beneficial to the farmers.

Furthermore, there have been certain digital programs that ensure that farmers in certain countries in Africa have access to financial products that can help to improve their farm productions. Organisations like the One Acre Fund in East Africa ensures that farmers are given loans to help them acquire the needed farm inputs that ensure that the farmers' level of productivity is greatly increased, provide training programs for farmers on how to use these improved inputs in a bid to maximize return on investment and ultimately provides market facilitation that ensures profit maximization²⁸.

It is important to mention that One Acre Fund partnered with the digital platform M-Pesa which allows for a flexible and easy way of repaying the loans the farmers get. Other companies in Africa have begun to engage in the use of innovative technologies to solve the problems farmers face in Africa and to improve farmers' production levels. Aerobotics is a South African company that provides a farm solution that makes use of an Artificial Intelligence program coupled with drones to help farmers manage their farms and provide an early warning system that identifies problems at a very early stage²⁹.

There is also an agritech start-up in Ghana called Acquahmeyer, which has established a drone service for farmers in that country. This ensures that farmers now have round-the-clock monitoring of their farms and provides a very efficient crop pest control platform that ensures the health of the crops is well managed.

According to the Food and Agriculture Organisation, the agricultural market in Africa will grow from \$200 million in 2015 to \$1 trillion by 2030, and Agritech companies have been identified as the backbone for the expansion³⁰.

THE AGRITECH SCENE IN AFRICA IS DEVELOPING THE CAPACITY TO MEET THE NEEDS OF SMALLHOLDER FARMERS AND ULTIMATELY ENSURE THE CONTINENT BECOMES AN AGRICULTURAL POWERHOUSE.

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- 25 ClimateAction, 2018. New technology is transforming Africa's agricultural industry
- 26 Fuglie, Keith, Madhur Gautam, Aparajita Goyal, and William F. Maloney. 2020. Harvesting Prosperity: Technology and Productivity Growth in Agriculture. Washington, DC: World Bank. doi:10.1596/978-1-4648-1393-1. License: Creative Commons Attribution CC BY 3.0 IGO
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- 28 Ndung'u, N. (2018). New frontiers in Africa's digital potential. Harnessing Africa's Digital Potential: New Tools for a New Age-Foresight Africa Report.
- 29 Kotze, C. (2019). Sub-Saharan Africa: "Info-Agritech" a Potential Game Changer. In Embedding Space in African Society (pp. 51-64). Springer, Cham.
- 30 Signé, L. (2018). The potential of manufacturing and industrialization in Africa: trends, opportunities, and strategies.

03

STATEMENT OF PROBLEM

In many countries of Africa, the agriculture sector is the biggest employer of labour and contributes greatly to their gross domestic product. For instance, in Ghana, the agriculture sector contributes 17% to the GDP and employs more than 52% of the population. In Zambia, it contributes 20% to the GDP and in Ethiopia this contribution is at 34.1%. The sector also employs more than half the population of these countries and many other countries. There is potential for the sector to contribute greatly to the continent's growth and development.

However, this potential is being threatened by a myriad of factors including climate change, lack of technological know-how on the part of farmers, low productivity due to unfavourable and outdated farming practices, and a generational shift in interest from agriculture among young people. These issues gave need to this research study which seeks to address the following:

- Why is agriculture not an attractive sector for young Africans who are early adopters of technology?
- How can programmes attract young African innovators to solve problems for smallholder farmers (SHFs) in the agricultural sector?
- What are the limitations and barriers for youth in considering agriculture as a career choice?
- Identify African youths with home-grown technology and innovation solutions which will protect smallholders from the effect of climate change and reduce the physical efforts required to increase productivity and income.

'I use the weather forecast to plan agriculture activities e.g., planting fertilizer application irrigation management'.

Kennedy Pedzisai
Smallholder farmer - **Zimbabwe**

04

AIMS AND OBJECTIVES OF THE STUDY

The study was undertaken with the following objectives:

- To provide evidence-based data for the launch of Heifer International Envision Africa's Agriculture 2030 program.
- To understand the challenges that have led to decreasing farm productivity and dwindling incomes amongst African smallholder farmers.
- To understand the challenges of technology adoption by smallholder farmers in Africa.
- To understand youth participation in agriculture, their fears and their impact on food security.
- To understand technological innovation in agriculture, its adoption rate, barrier-to-entry, scalability, and potential impact on supporting agriculture development on the continent.

05

SCOPE OF STUDY

This report covers three regions of Africa, namely West, South and East Africa. It examines the current realities of agriculture, youth and technology in the following countries:

- East Africa: Ethiopia, Kenya, Rwanda, Tanzania, and Uganda.
- West Africa: Ghana, Nigeria, and Senegal.
- Southern Africa: Malawi, Zambia, and Zimbabwe.

The report profiles these countries and provides information on the following: overview of country, current realities of agriculture, challenges, opportunities, and overview of youth in agriculture and tech.

In addition, the report surveys stakeholders in the agriculture sector in Africa and it targets 25,000 youths across the profiled countries and 50 stakeholders comprising innovation hubs, agritech startups and smallholder farmers.



06

RESEARCH DESIGN: DATA AND METHODOLOGY

 **29.9k**
YOUTH
RESPONSES

 **299**
SMALLHOLDER
FARMERS

 **110**
AGRIC-FOCUSED
ORGANISATIONS



SAMPLE DESIGN

This research used qualitative research methodology to gather data and create an understanding of the problem statement as it affects stakeholders in the countries in focus. Also, virtual focus group discussions were employed to approach the research objectives from different viewpoints given the multiplicity of stakeholders connected to the problem. To complement data gathered through the virtual focus groups, we used e-surveys to document current attitudes and perceptions of stakeholders towards agriculture, barriers to innovation in agri-tech with youths and challenges faced by smallholder farmers in their access and use of technology. The e-surveys used the following mediums to reach the intended participants; Whatsapp groups, social media ads, youth influencers on the internet, SMS and telegram groups. In researching the problem, we also used desktop research methodology such as literature review, reports, and review of policy documents from governments, technology and social sector stakeholders.

In preparing to execute the research, a pilot study was conducted to pre-test the data collection tools in the virtual field in at least

three sites. Virtual field supervisors recorded and documented the pilot's findings and modified data collection tools as required. The research team organized two virtual training workshops on the final tools to be used and interview techniques for information collection before executing the virtual field plan for virtual field investigators and supervisors. The main objectives of the training workshop were:

- Describe the purpose and objectives of the assessment
- Describe the data collection tools and how to use them
- Orientation towards the study tools with every question thoroughly discussed
- Techniques for conducting focus group discussions and in-depth interviews
- Ethical considerations

In total, survey responses were received from 29,954 youths, 299 smallholder farmers and 110 agric-focused organizations. It should be noted that the data is representative of the eleven Heifer focused countries with each country contributing at least 5 to 13% of the total dataset.

07

RESULTS

The research used a two-pronged approach in its online survey targeted at youths, smallholder farmers and agric-focused organisations in eleven countries within Heifer's focus. The first method was using a survey to reach the three different groups comprising youths, smallholder farmers and agric-focused organisations, and the second method was conducting a focus group discussion with youths in six countries to have an indepth understanding of the problem statement. This mode of data collection provided evidence-based analysis of the issues around young people and agriculture, barriers and thinking, smallholder farmers' challenges and the agric-focused organization's point of view about agric innovation.

The following results were observed from the analysed data:

- There is a low agricultural tech adoption across the surveyed countries with only 23% of youth engaged in agriculture using any form of agricultural technology (an App, SMS, website, software).
- **Access to land or ownership is a major cause of concern as 59% of youths surveyed indicated they lack both.**
- Funding, training and access to agriculture technology are the three key areas to support youth to encourage their involvement in agriculture. **These three areas of concern accounted for 38%, 24% and 11% respectively in the analyzed data.**
- According to the surveyed Agric-focused organizations, **the best way to engage youth in agriculture in Africa is through technological innovation (39%),** government support for young farmers (32%) and inclusion/adoption of youth in agric policy (21%).
- **The youths surveyed suggests that access to finance (37%), access to land (14%) and lack of training (12%)** are the three key barriers to youth engagement in agriculture in Africa.
- Smallholder farmers and agric-focused organisations surveyed suggested that literacy, socio-economic status and inadequate/no extension service are the key reasons for the low adoption of technology.
- Smallholder farmers indicated that enlightenment/ information and affordability will encourage them to embrace technology innovation.
- Adverse weather conditions (30%), insects, pests and disease (17%) and technology barriers (14%) **have negatively impacted farmers' productivity.**
- Evidence from the survey notes that the critical success factor(s) of an agric-tech solution is the ease of use, range of information and affordability.
- **The coronavirus outbreak affected 40% of agric-focused organizations as they had to temporarily close business, 38% experienced a reduction of average purchase amount per customer and 36% do not have the financial capital to grow back their businesses.**

08

PRESENTATION OF FINDINGS



A TOTAL OF 29,954 YOUTHS , 299 SMALLHOLDER FARMERS AND 110 AGRICULTURE-FOCUSED ORGANIZATIONS COMPLETED AN ONLINE SURVEY. THE DATA COLLECTED IS REPRESENTATIVE OF ELEVEN AFRICAN COUNTRIES WITH EACH COUNTRY CONTRIBUTING AT LEAST 5% TO 13% OF THE TOTAL DATASETS.

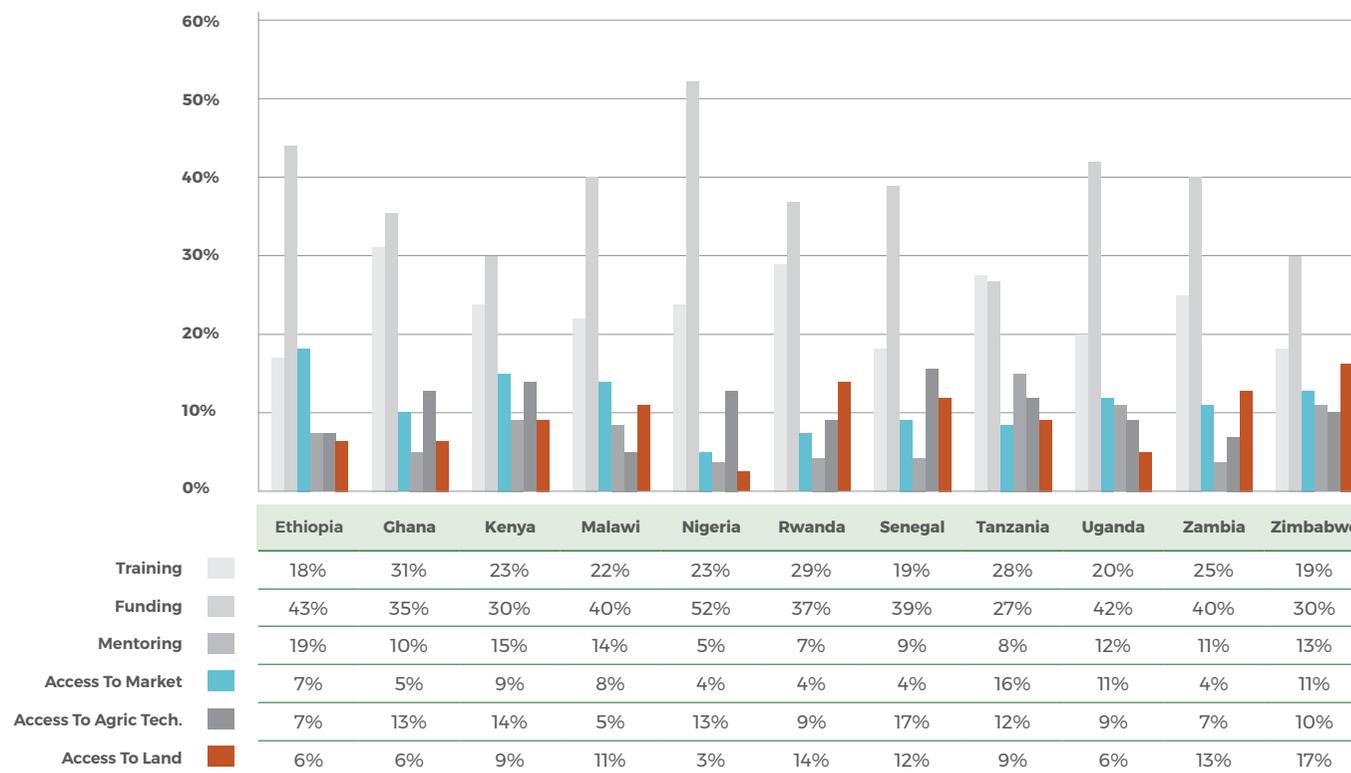
Ethiopia	Ghana	Kenya	Malawi	Nigeria	Rwanda	Senegal	Tanzania	Uganda	Zambia	Zimbabwe	Others	Total
1,457	2,678	2,935	1,446	3,937	3,362	1,469	3,914	3,294	3,026	2,436	1,368	29,954

From the survey and focus group discussions, three main areas of support were identified by youths working in the sector.

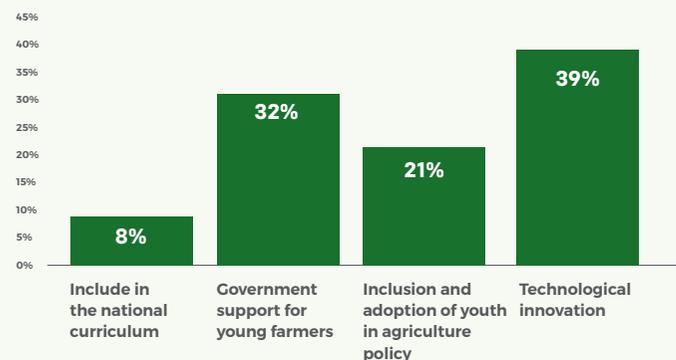
- 38% required financial support
- 34% emphasized the need for training and mentorship
- 11% required access to Agric-Tech

Ten out of 11 countries, with the exception of Tanzania agreed that the most important support required is funding. When placed in context, training and mentorship are seen as more important than funding in Ghana, Kenya, Tanzania, and Zimbabwe. More youths stressed the need for support in the area of access to market in Tanzania, Uganda and Zimbabwe. Youths in Senegal, Kenya, Nigeria and Ghana prioritized the need for support in Agric-Tech. Access to land was an acute need in Zimbabwe, Rwanda and Zambia.

How Youths Can be Supported To Take Up Agriculture



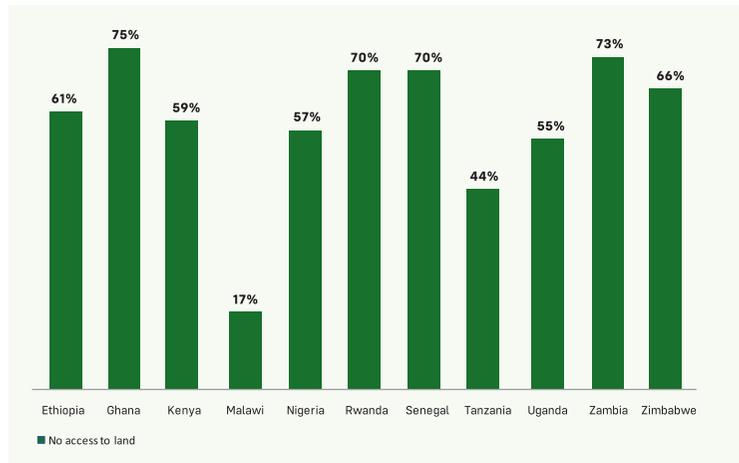
How To Engage Youths In Agriculture



Organisations working in the sector suggested that the best way to engage youths in agriculture is through technological innovation (39%), government support for young farmers (32%) and inclusion as well as adoption of youth in agriculture policy formation (21%).

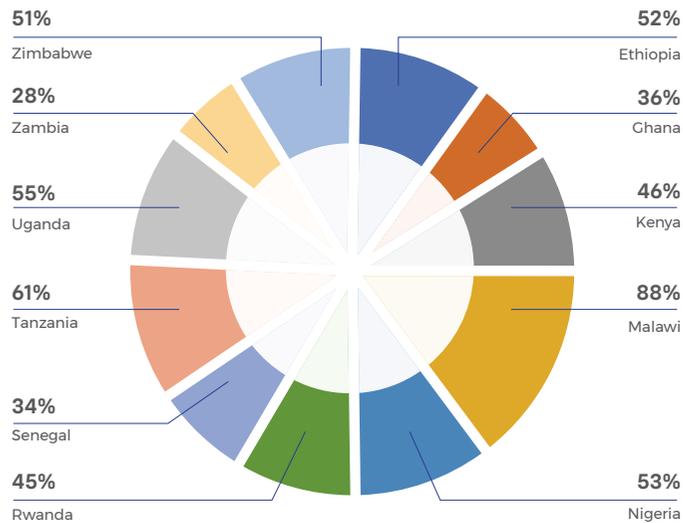
Most youths in Africa do not have access to land for agriculture. Fifty-nine percent of youths surveyed do not have access to or own land. Land ownership amongst young people is lowest in Ghana, Zambia, Senegal and Rwanda. Youths in Malawi seem to have access to land with only 14% having no access the lowest among countries surveyed.

Percentage of youth with no access to land



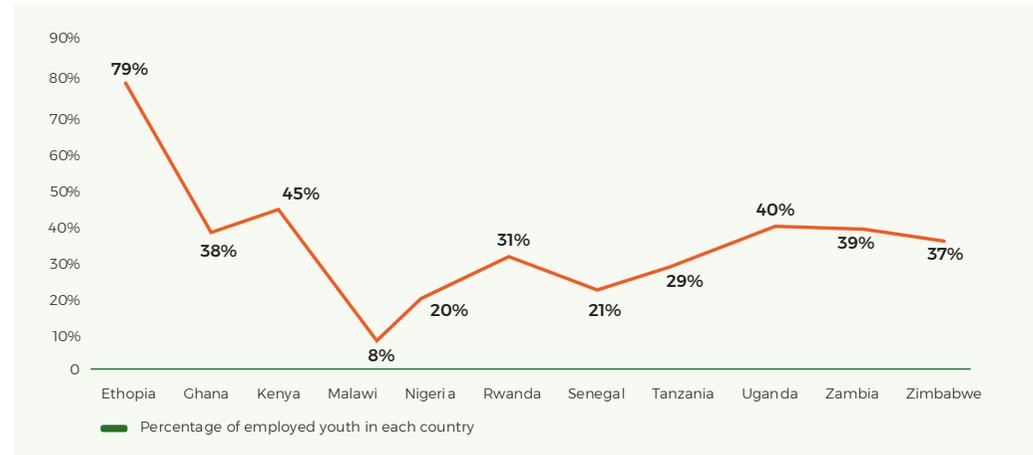
Youths surveyed are engaged in at least one form of agriculture. Malawi, Tanzania and Uganda boast of the highest percentage of youths engaged in agriculture.

Youths engaged in Agriculture



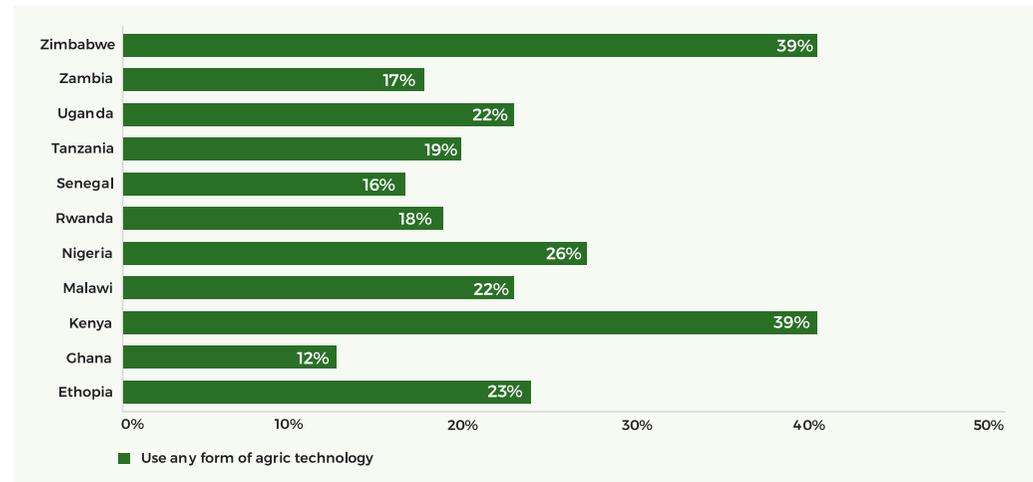
This survey provides a snapshot of the unemployment statistics of Africa. Sixty-six percent of youths who completed the survey are unemployed. The highest number of unemployed youths were in Ethiopia, Kenya and Uganda.

Percentage of Employed youth in each country



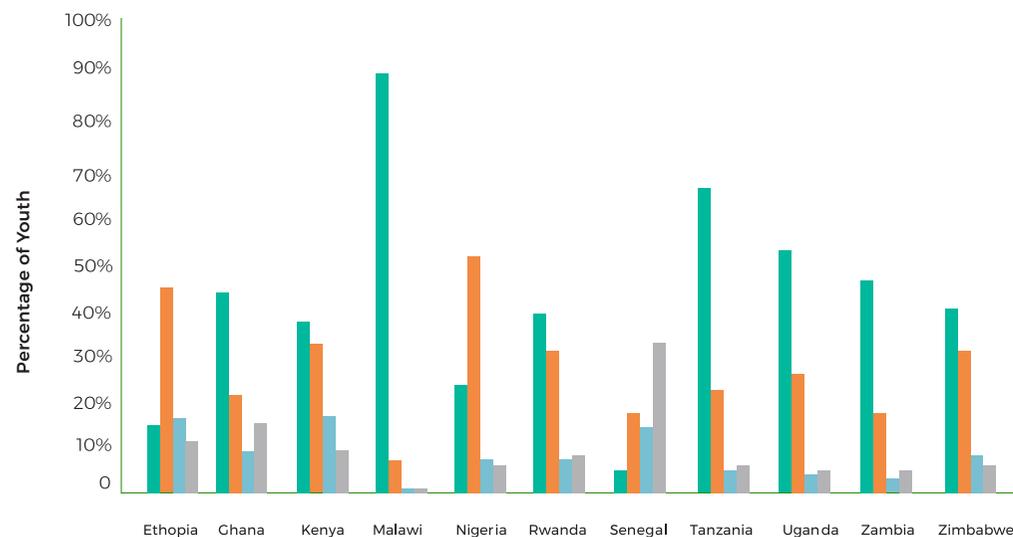
Overall, technology adoption in Africa is quite low. Ghana, Senegal and Zambia have the lowest Agri-Tech adoption rate, while Zimbabwe, Kenya and Nigeria have the highest adoption rates.

Youth in agriculture using any form of agric technology



Crop and Livestock agriculture are the major types of agriculture that youths are involved in. This is supported by the smallholder farmers' survey, with 30% involved in crop agriculture, 16% in livestock agriculture while 60% are involved in both. Livestock agriculture is highest in Ethiopia and Nigeria.

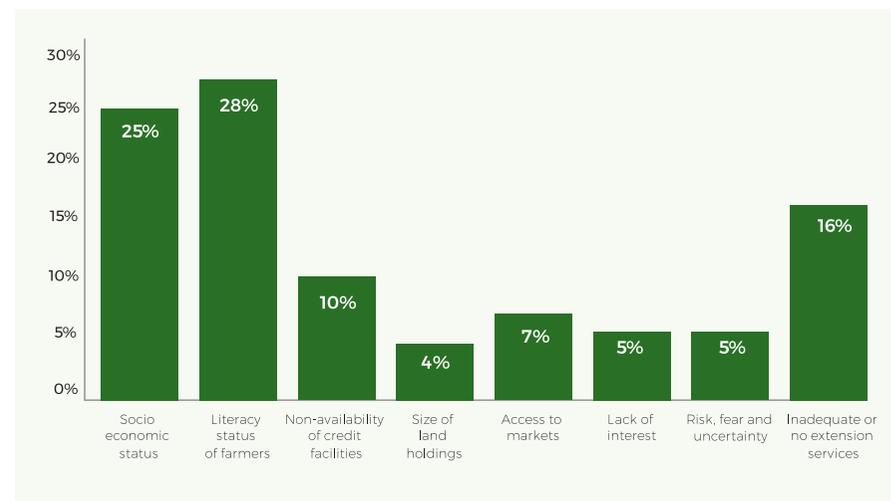
Type of agriculture engaged in by youths



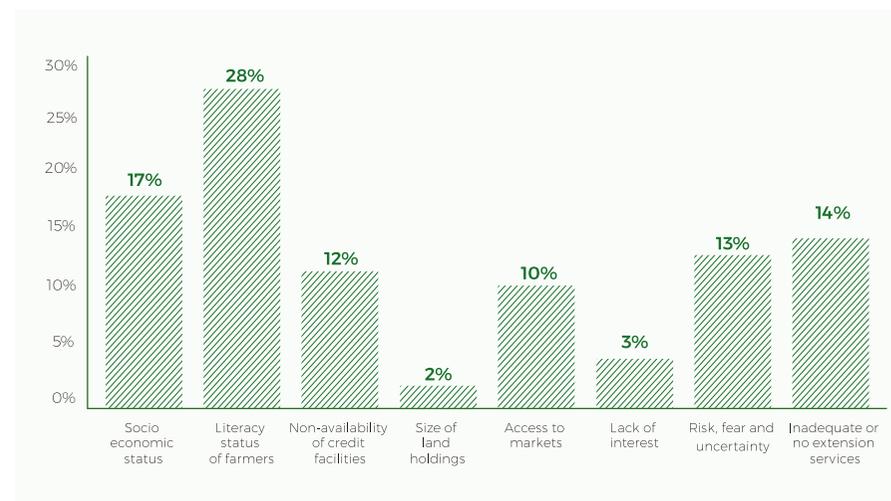
	Ethiopia	Ghana	Kenya	Malawi	Nigeria	Rwanda	Senegal	Tanzania	Uganda	Zambia	Zimbabwe
Crop	0.14	0.42	0.36	0.89	0.23	0.38	0.05	0.64	0.51	0.45	0.39
Livestock	0.43	0.21	0.31	0.07	0.5	0.3	0.17	0.22	0.25	0.17	0.3
Agric Processing	0.16	0.05	0.07	0.01	0.03	0.05	0.14	0.05	0.04	0.03	0.08
Agric Technology	0.11	0.15	0.09	0.01	0.06	0.08	0.32	0.06	0.05	0.05	0.06

Smallholder farmers surveyed suggested that their low literacy level, socio-economic status, and inadequate or no extension service are the key reasons for their low adoption of technology. This is supported by organisations who work in the sector.

Organisation perspective: Most significant reason for the low rate of adoption of technology by smallholder farmers in africa

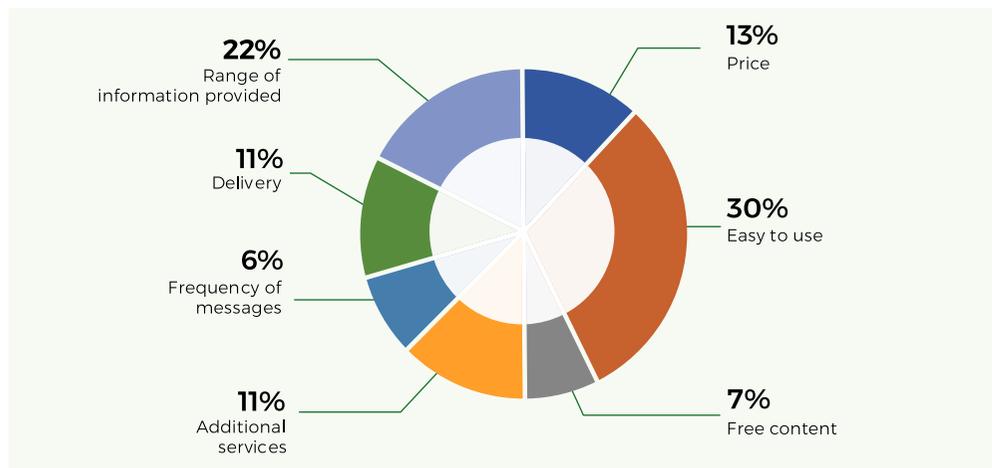


Farmers perspective: reasons for low rate of adoption of technology by smallholder farmers in Africa



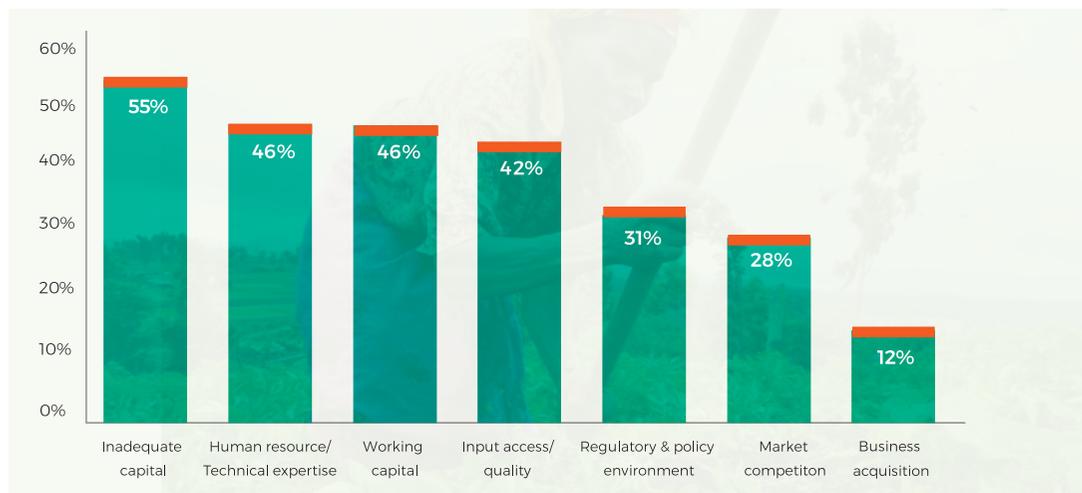
The critical success factor(s) of agri-tech solutions are: ease of use, range of information and affordability, are the three critical success factors of agri-tech solutions.

Critical success factor(s) of agric-tech solutions



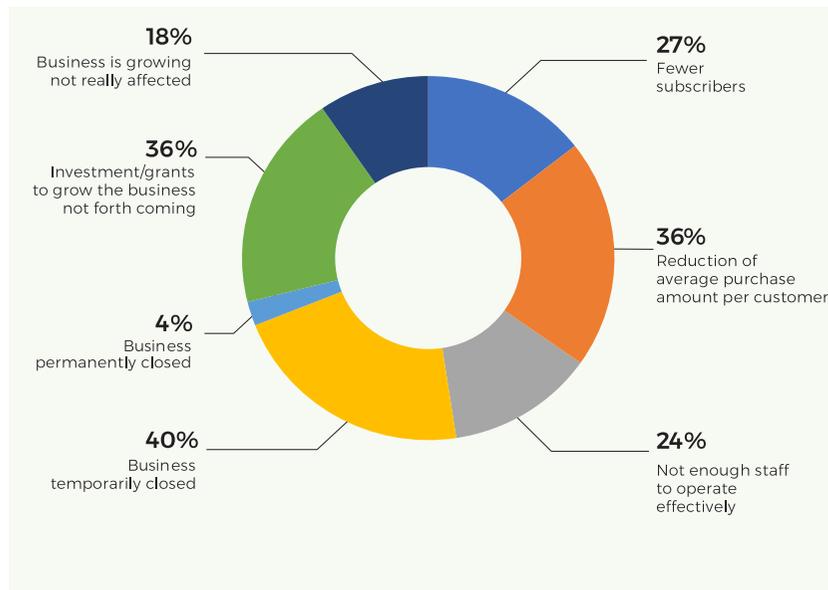
Working capital, digital literacy as well as skilled labour force are challenges to agri-tech adoption.

Barriers to Agri-Tech Adoption



40% of organisations working in the sector temporarily closed their business, 38% experienced a reduction of average purchase amount per customer while 36% lack the investment to grow the business.

How Covid Impacted Agric focused organisations



09

FOCUS GROUP DISCUSSION



Focus group discussions were held with youths in six African countries, Nigeria, Ghana, Kenya, Zambia, Rwanda, and Uganda to find out more about the barriers limiting youths working in agriculture and agri-tech innovation in Africa.

Participants were asked which career is the most attractive in their countries. The careers that stood out in all groups were **Medicine, Technology (ICT and Data Science) and Agriculture. This choice is as a result of job security and access to opportunities seen in Medicine and Tech.** While there was a general belief that agriculture is attractive to youths because it is a way for youths easily start a business, they also recognized the importance of agriculture to a nation's development.

However, during the focus group sessions, it was clear that there are many issues which surround the agricultural sector. In terms of challenges faced by young people, there were two recurrent themes: **access to markets and land ownership.** Participants felt the government in their countries had some more work to do increasing policies which address these two issues. Other barriers include a **lack of access to finance and limited knowledge about modern agriculture techniques and the importance of mentorship**

While it is still early to evaluate the impact of digitalization of farming systems in Africa, in terms of productivity and improvement of human welfare, there is already a promising trend: technology is

driving farming interest for young people. During the focus group discussions, the majority of the participants agreed that technology had a role to play in agriculture in making it more attractive to youths.

The participants described various areas in which technology can benefit agriculture, among which was in irrigation; creating easier methods to irrigate farm land using drone technology, as well as creating localised applications to help monitor and predict climate change as this was identified as an issue for farmers in Africa. Also very key is the **creation of applications which will bring farmers and the market together to maximise yield, reduce waste and increase profits.**

10

COUNTRY
PROFILES





ETHIOPIA

Overview of country information

Ethiopia is one of the oldest and growing economies in Sub-Saharan Africa³². Ethiopia ranks as the second most populous country in sub-Saharan African with a population estimated around 114 million³³. The population is expected to increase at a yearly rate of 1.9% and reach 136 million people by 2030³⁴. Despite the population growth and the location of the country, Ethiopia still remains one of the poorest economies in the world with a per capita income of \$850³⁵. Ethiopia's economy largely depends on agriculture and boasts of 70% employment rate³⁶.

According to a 2018 report, Ethiopia has agricultural land of about 36.3% of the total land area in the country. 15.2% of this land is arable, 1.1% of the land plants permanent crops, and 20% is used for permanent pasture³⁷. Coffee, oily seeds, and cut flowers are the top agricultural exports of Ethiopia³⁸.



Digital finance makes it easy for me to access micro-loans'

Bigabwa Pascal - Smallholder farmer - Uganda



32 FAO 2021. <https://www.fao.org/ethiopia/fao-in-ethiopia/ethiopia-at-a-glance/en/>
 33 AFD. <https://www.afd.fr/en/page-regions-pays/ethiopia>
 34 Worldometer 2021. <https://www.worldometers.info/world-population/etiopia-population/>
 35 World Bank 2021. <https://www.worldbank.org/en/country/ethiopia/overview>
 36 Nations Online 2021. <https://www.nationsonline.org/oneworld/ethiopia.htm#Business>
 37 CIA 2021. <https://www.cia.gov/the-world-factbook/countries/ethiopia/>
 38 OEC 2019. <https://www.oec.world/en/profile/country/eth>



70%
OF THE
POPULATION
IN ETHIOPIA IS
EMPLOYED IN
AGRICULTURE AND
AGRICULTURE IS
THE BACKBONE OF
THE ECONOMY



90%
OF ETHIOPIA'S
FOREIGN
EXCHANGE IS FROM
AGRICULTURE



27.5bn
USD IS
CONTRIBUTED
BY AGRICULTURE
WHICH IS 34.1%
OF GDP

Overview of Agriculture: Current realities

Agriculture is the foundation and backbone of Ethiopia's economy. Agriculture offers the highest rate of employment of 70% in Ethiopia³⁹. It accounts for half of the GDP and 90% of foreign exchange, with dependence largely on crop and pastoral farming. The Ministry of Agriculture reports that agriculture contributes 27.5 billion dollars or 34.1% to the GDP, employs some 79% of the population, accounts for 79% of foreign earnings, and is the major source of raw material and capital for investment and market⁴⁰.

The country's agriculture is dominated by smallholder farmers whose activities are majorly subsistence farming⁴¹. These farmers have also continued to practice ancient, rain-fed, and small scale agriculture⁴². The agricultural exports are provided by other small cash-crop farmers. Coffee, dried pulses, hide and skin, oilseeds, cereals, potatoes, sugarcane, and vegetables are the major export crops produced in Ethiopia. Coffee is the largest foreign exchange commodity in Ethiopia while cut-flower is also a growing export crop⁴³.

Furthermore, the Ministry plans to increase wheat productivity from 2.7mt/ha in 2019 to 4 mt/ha by 2023 and reduce wheat import from 1.7 million mt in 2019 to zero by 2023. These would be achieved by acid soil and vertisol management, intensification, expanded use of irrigation, mechanization, and private sector partnership.

Challenges

Periodic droughts, soil degradation due to overgrazing, deforestation, high taxation, and poor infrastructure plague Ethiopia's agriculture (making it difficult and expensive to get goods to market). Subsistence farming, low productivity, inadequate infrastructure and resources, as well as severe vulnerability to extreme rainfall constitute Ethiopian agriculture. Likewise, there is scarcity of modernized and hybrid seed for planting.

The Ethiopian agriculture sector has faced major challenges as a result of COVID-19, such as with the lockdowns in major cities, harvesting processes and labor scarcity have harmed supporting infrastructure across the agriculture sector. Additionally,

movement across state borders has been severely restricted, preventing the movement of agricultural products and, as a result, affecting sales of the generated agricultural commodities.

Opportunities

The Ethiopian Government set up the Growth and Transformation Plan to reach certain goals. Primarily, growth in the market should reach 8.1 percent per year during this time frame. This includes bolstering smallholder farmers' productivity, enhancing marketing systems, upgrading participation of the private sector, increasing the volume of irrigated land, and curtailing the number of households with inadequate food. Besides, it is hoped that the number of key crops is doubled from 18.1m metric to 39.5m metric tonnes. These programmes should also result in Ethiopia getting to middle-income status by 2025.

The favorable government policies encouraging the private sector and the favorable agro-climatic conditions will be two major drivers behind the growth of the market studied. Agriculture in Ethiopia is the largest component of its economy and employs the

39 Nations Online 2021. <https://www.nationsonline.org/oneWorld/ethiopia.htm#Business>

40 Agricultural and Rural Transformation in Ethiopia, 2020. https://media.africaportal.org/documents/Agricultural-and_rural_transformation_in_Ethiopia.pdf

41 FAO 2021. <https://www.fao.org/ethiopia/fao-in-ethiopia/ethiopia-at-a-glance/en/>

42 Agriculture and Food Security, 2018. <https://agricultureandfoodsecurity.biomedcentral.com/articles/10.1186/s40066-018-0208-y>

43 FAO 2021. <https://www.fao.org/ethiopia/fao-in-ethiopia/ethiopia-at-a-glance/en/>

majority of the Ethiopian population. The majority of these are smallholder farmers practicing subsistence farming on less than one hectare of land. **These farmers, whose output is predominantly cereal crops, account for 95.0% of the agricultural production in Ethiopia.**

As the state owns all land in Ethiopia, rural residents have been guaranteed access to land through a law that grants them a right to obtain agricultural land for free.

Overview of youth in agriculture and tech

Ethiopia's youthful population is an incredible asset and untapped resource for positive growth. Of Ethiopia's population, estimated at 104 million, 41 percent is under the age of 15. More than 28 percent are aged 15 to 29. Youth unemployment is estimated at nearly 27 percent⁴⁴. Thus, the youth are looking toward employment options other than agriculture.

The Ethiopian government has instituted new laws to grant youth unlimited access to agric lands. Lands can now be bought in the market and be rented on a long-term basis from other farmers. Local authorities that have been the traditional source of farmland have opened up unlimited capacity to accommodate new farmers as all arable land is already occupied in these areas.

THE INNOVATORS

Startup: Debo Engineering,
Co-Founder: Jermia Bayisa and Boaz Birhanu Tullu
Location(s): Ethiopia

Overview:
Debo engineering is a startup technology company that uses recently emerging technology such as ML, IoT, IP, WSN, Data Science, mobile computing, web, and related technologies to solve critical problems in Africa, especially agriculture.

Innovation:
They successfully designed a mobile application for an accurate representation of crop disease. They also offer drone services to improve farm analysis and crop disease classification and prediction.

Website:
<https://deboengineering.com/>

Social Media Page:

Twitter: @deboengineering
Facebook: Debo Engineering PLC



Unless African innovators and youths are united and solve African problems by Africans, Africa will remain under a colony of technology.





KENYA

Overview of country information

Kenya is regarded to be the growing commercial hub in East Africa⁴⁵. Kenya has about 54 million inhabitants which is an equivalent of 0.69% of the total world population⁴⁶. Kenya has not totally experienced urbanization as the country only has about 27.9% urban population. The country boasts of fairly well developed agricultural sector for both local consumption and international export⁴⁷. Kenya has a land area of 569,140 km² and an agricultural area of 27,630 km²⁴⁸.

Despite having a large expanse of agricultural land, less than 8% of the land is used for crop and food production. Less than 20% of the land is suitable for cultivation, of which only 12% is classified as high potential agricultural land due to adequate rainfall and about 8% is medium potential land⁴⁹. The rest of the land is arid or semiarid and Kenya is known to be bordered by deserts and glaciated mountains.



Most technological innovations require literacy levels which many farmers lack

Mariana Jumbe - Smallholder farmer - Malawi



- 45 Oxford Business Group. 2018. <https://oxfordbusinessgroup.com/kenya-2018/country-profile>
- 46 Worldometer 2021. <https://www.worldometers.info/world-population/kenya-population/>
- 47 New Agriculturist 2010. www.new-ag.info/en/country/profile.php?a=1787
- 48 FAO 2016. <http://www.fao.org/countryprofiles/index/en/?iso3=KEN>
- 49 Nations Encyclopedia Agriculture - Kenya - export, growth, area, crops, farming, policy, sector





31.4%

REDUCTION IN RURAL POVERTY HAS BEEN WITNESSED IN KENYA.



33%

OF KENYA'S GDP IS CONTRIBUTED BY AGRICULTURE



90%

OF FARMERS BETWEEN AGES 18-35 IN KENYA HAVE HIGH LEVEL OF ENGAGEMENT WITH ICT

Overview of Agriculture: Current realities

The agricultural sector as well as tourism constitutes the major source of Kenya's economic development. It has primarily contributed to the growth of the rural economy in Kenya. **Rural agriculture has witnessed about 31.4% reduction in rural poverty⁵⁰. Agriculture is said to be contributing approximately 33% to Kenya's Gross Domestic Product (GDP)⁵¹.** Its contribution is tremendous in employing more than 56% of the total population and about 70% of the rural population. Major agricultural products in Kenya are tea, coffee, horticulture, dairy products, poultry, wheat. **Tea, coffee, cut-flowers, fruits, and vegetables are the major agricultural export products from Kenya.**

Notwithstanding, smallholder farmers and agricultural enterprises continue to face challenges of growing their businesses and improving the quality of agricultural goods.

Challenges

The agriculture sector continues to play a vital role in the rural economy. The sector was one of the first to fully devolve the function of service provision to the county governments underscoring the importance of the county governments' role in ensuring food security. Agriculture and agribusiness continue to face some challenges of getting the best of their activities. Some of these challenges are lack of infrastructure, inadequate water supply, and less arable land. **All efforts to introduce irrigation farming to Kenya have not met higher results as just about one-fifth to one-fourth irrigable land has been developed⁵².**

Those who are accustomed to rainfall farming are being forced to move into more fertile regions where they are less susceptible to drought and other extreme weather conditions⁵³.

The dynamics of poverty within Kenya are changing and directly influence the country's agricultural sector. Currently 46% of the population live on less than one USD

a day, 36.5% are food insecure and 35% of children under five are stunted (chronically malnourished) in Kenya. The country's population has increased significantly and at the current rate of growth, it will double in the next 27 years, reaching 81 million in 2039⁵⁴. As a result of this rapid increase, land parcels in the areas of high agricultural potential are decreasing in size, affecting food production⁵⁵.

Opportunities

Agriculture has a part in the future of Kenyan economic development. The president has recorded as part of his Big Four agenda that was announced in 2020 to ensure food and nutritional security of all Kenyan citizens⁵⁶.

Judging from this, there is a rapid shift more than before to agricultural activities. Given the importance of agriculture in rural areas of Kenya where poverty is prevalent, the sector's importance in poverty alleviation cannot be overstated. Strengthening and improving the performance of the agricultural sector and enabling the engagement of the poorest

50 The World Bank, 2019. Kenya Economic Update: Transforming Agricultural Productivity to Achieve Food Security for All
51 USAID 2021. <https://www.usaid.gov/kenya/agriculture-and-food-security>
52 FAO 2016. <http://www.fao.org/kenya/kenya-at-a-glance/en/>
53 FAO 2016. <http://www.fao.org/kenya/kenya-at-a-glance/en/>
54 FAO 2016. <http://www.fao.org/kenya/kenya-at-a-glance/en/>
55 FAO 2016. <http://www.fao.org/kenya/kenya-at-a-glance/en/>
56 Oxford Business Group, 2018. <https://oxfordbusinessgroup.com/kenya-2018/country-profile>

and most vulnerable in this process is therefore a prerequisite and a necessary condition for achieving recovery and growth in Kenya after recent years of drought and slow development.

Re-orienting public expenditure from private to public goods, particularly to agricultural research and development, extension and training, and measures that reduce market transaction costs.

Farmer-centered approach. **The knowledge of farmers themselves is often overlooked. There is also an association between women's empowerment and productivity.** New forms of farmers' organization may be required.

Farmer services: Index insurance in the agriculture sector is expanding and demonstrating results, as are digital technologies that facilitate market access. Measures to bring financial and agricultural markets closer together could improve productivity.

Overview of youth in agriculture and tech

Agriculture is not for the adults alone. Youth should begin to see a future in agriculture. In Kenya, about 65% of youths live in the rural areas⁵⁷. Youth involvement in agriculture may take different paths, not necessarily crop farming. Other areas could involve agricultural investment, service providers, logistics, capacity and value building.



What also distinguishes this new generation of youth in agriculture is its use of technology, including digital financial services (DFS). As Mercy Corps AgriFin Accelerate found, **90% of farmers ages 18 to 35 in Kenya have high levels of engagement with information and communication technology.** They are active users of social media, particularly Facebook, Google and WhatsApp, and are bringing a new dynamism and perspective to agriculture.

Youth engage with DigiFarm as farmers or through opportunities that support agricultural production, such as managing agro dealer outlets associated with the platform or providing soil testing, crop spraying or veterinary services. Many find its services to be useful.

57 CGAP, 2019. <https://www.cgap.org/blog/youth-agriculture-new-generation-leverages-technology>



RWANDA

Overview of country information

Rwanda is a landlocked country in Central Africa located on the north of Burundi and East of DRC. The country has a total land area of 24,668 sq km. Out of the total land area, 74.5% is agricultural land in which just 47% is arable. Rwanda is one of the most densely populated countries in Africa⁵⁸.

The majority of its about 12.5 million inhabitants are located in rural communities. Rwanda is a rural and agrarian country that is highly dependent on agriculture for economic growth. The country earns 63% of its export earnings from agriculture. Some of the agricultural products in Rwanda are bananas, coffee, tea, potatoes, beans, gourds, milk, taro, and cassava.

The extent of agricultural dependence shows in the 75.3% employment rate that it offers to the inhabitants⁵⁹. The country experiences two major seasons in a year: long dry season from June to August, and heavy rainfall from March to May⁶⁰.



58 CIA 2021. <https://www.cia.gov/the-world-factbook/countries/rwanda/>

59 CIA 2021. <https://www.cia.gov/the-world-factbook/countries/rwanda/>

60 FAO 2015. <http://www.fao.org/rwanda/our-office-in-rwanda/rwanda-at-a-glance/en/>



70%
OF THE
POPULATION
IN RWANDA
PRACTICES
SUBSISTENT
FARMING



90%
OF RWANDA'S
LAND IS ON HILLS
RESULTING IN
LOSSES OF LAND
FROM SOIL EROSION
OF UP TO 1.4M
TONNES OF LAND
YEARLY

33%
OF RWANDA'S
GDP IS FROM
AGRICULTURE

Overview of Agriculture: Current realities

Agriculture is one of the top economic activities in Rwanda with more than 70% of the population practicing subsistence farming. The period for cultivation can be divided into the first cultivable season (from September to January) and the second cultivable season (from February to June). In the marshlands, where water is abundant, there is also a third agricultural season for the cultivation of rice and vegetables.

The agricultural sector accounts for 33% of the national GDP. **In general, Rwanda's GDP has been growing at the rate of 7% since 2014⁶¹.** Tea and coffee are the major exports while plantains, cassava, Irish potatoes, sweet potatoes, maize and beans are the most productive crops. Rwanda exports dry beans, potatoes, maize, rice, cassava flour, maize flour, poultry and live animals within Eastern Africa. Despite the large population involved in agriculture, Rwanda's agriculture has not experienced the successful revolution it aspires⁶². The agricultural sector still faces some deep problems.

Challenges

Most of the farmers in Rwanda are subsistence farmers and often among the poorest of the population. The issue of landlessness is common to Rwanda's agriculture because oftentimes, farmers are forced to sell their farmland in order to survive. Since they grow to eat, the farmlands are subjected to other developments outside agriculture⁶³.

Also, land degradation and soil erosion are part of the challenges that the subsistence farmers in Rwanda face. **Approximately 90% of Rwanda's land is on hills resulting in soil erosion, soil loss, and decreased fertility. An estimated 1.4 million tonnes of land is said to be lost yearly. This is equivalent to losing 320,000 US dollars⁶⁴.** Land degradation is also resulting in land privatisation.

Land use and distribution is another problem of agriculture in Rwanda. In Rwanda, land categorized as rural is nearly 98% of the total land area, with around 49% classified as arable. According to a land law passed in 2005, a private market was created for land titles and customary land tenure systems

were abolished. Land owners are required to register their land ownerships and land titles are equally available for women and men. However, women who are informal have uncertain land rights and most times have difficulties in claiming inheritance.

Rwandan agriculture is highly reliant on rainfalls and susceptible to climate shocks. Agricultural productivity is variable from season to season due to the low use of water supplies for irrigation.

Low crop and livestock productivity are due to lack of proper farming methods, low input use, and poor production processes. When the Government of Rwanda (GoR) launched the Crop Intensification Program in 2007, the use of chemical fertilizers steadily increased (CIP). Subsidized fertilizers are given to farmers for the cultivation of six priority crops under the scheme. Despite this, farmers' adoption of fertilizers remains quite low when compared to other countries in the region.

Processing capacity issues and the introduction of higher-value-added goods to the industry.

61 FAO 2015. <http://www.fao.org/rwanda/our-office-in-rwanda/rwanda-at-a-glance/en/>

62 The Conversation, 2017. <https://theconversation.com/rwandas-agricultural-revolution-is-not-th-success-it-claims-to-be-86712>

63 The Conversation, 2017. <https://theconversation.com/rwandas-agricultural-revolution-is-not-th-success-it-claims-to-be-86712>

64 FAO 2015. <http://www.fao.org/rwanda/our-office-in-rwanda/rwanda-at-a-glance/en/>

Between 1999 and 2008, the percentage of processed food crops never surpassed 6.5%. Furthermore, just 34% of the total food produced in the country makes it to the market. The lack of adequate technology, expertise, investment incentives, and infrastructure development are the reasons for untapped processing capacity. Processing companies find it difficult to operate due to a lack of sufficient water and, at times, energy supplies.

Opportunities

Due to shortage in land availability, the Government of Rwanda is promoting intensification as a strategy to increase production and farmers' incomes. According to the Strategic Plan for the Transformation of Agriculture (PSTAIII), the long term goal is to move Rwandan agriculture from a largely subsistence sector to a more knowledge-intensive, market-oriented sector, sustaining growth and adding value to products. A measure to do this will be to consider agriculture as a catalyst sector. Also, they will promote the development of value chains with stronger links with the private sector. The crops of interest for this PSTAIII are coffee, dairy, horticulture and cereals among others⁶⁵.

For the improvement of agriculture to tolerate climate shock, Rwanda's National Strategy for Climate Change and Low Carbon Development are moving to ensure the stability and prosperity of the sector by 2050. The means to achieve these include introducing sustainable use of organic waste to improve soil fertility, and improved agriculture through irrigation and terracing⁶⁶.

Overview of youth in agriculture and tech

In Rwanda, the youth population is about 29% of the total population⁶⁷. The official age range for youth in Rwanda is 16-30 years, which differs from the UN age range for youth (15-24 years). There is evidence that youth from all over the world are interested in learning about new technologies related to farming more easily. Besides, young farmers are keen on increasing their production through improved and modern technologies⁶⁸. Agritech has developed a new and regular knowledge lab feature in Rwanda to invite farmers and heads of farmer cooperatives to talk about the challenges they face. Using this information, young people and their mentors will have more focus for the areas needing new ideas, and they will attempt to develop suitable ICT solutions in response to their complaints.

THE INNOVATORS



Startup: Hello Tractor,
Founder: Jehiel Oliver
Location: Offices in Nigeria & Kenya, Operational in 13 African countries

Overview:
 Hello tractor is an agricultural technology company that connects tractor owners and farmers through IoT enabled farm equipment sharing applications.

Innovation:
 Hello Tractor's user-friendly software enables farmers to request affordable tractor services while providing enhanced security to tractor owners through remote asset tracking and

virtual monitoring. In just a few short years, Hello Tractor has become the largest connected SaaS solution for equipment service providers, connecting a marketplace of 3000 tractors to more than 250,000 farmers.

Smallholder Farmers Reached: 250,000

Website:
[https://: https://hellotractor.com/](https://hellotractor.com/)

Social Media Page:
Social Media Page:
Facebook; HelloTractor,
Instagram:@
 Hellotractor, **Twitter:@**
 hellotractorLinkedIn



65 FAO 2015. <http://www.fao.org/rwanda/our-office-in-rwanda/rwanda-at-a-glance/en/>

66 New Agriculturist. <http://www.new-ag.info/en/country/profile.php?a=2694>

67 RWANDA GOV. https://assets.publishing.service.gov.uk/media/5af954b2e5274a25dbface35/Rwanda_briefing_note__Regional_Analysis_of_Youth_Demographics_.pdf

68 FAO, 2014. <https://www.docplayer.net/10132934-Youth-and-agriculture-key-challenges-and-concrete-solutions.html>



TANZANIA

Overview of country information

Tanzania is an East Africa nation located on the south of the equator with an economy primarily based on agriculture. Although Tanzania's population is more than 56 million, the country still finds its place as a low-income country⁷⁰. Tanzania had around 44 million hectares of arable land in 2016, but only 33% of it was under cultivation. Almost 70% of the poor population live in rural areas, and nearly all of them are employed in the agriculture industry.

Land is an essential resource in achieving food security; maize, sorghum, millet, rice, wheat, beans, cassava, potatoes, and bananas are among Tanzania's nine main food crops⁷¹. With over \$1 billion in earnings from cash crop (tobacco, sugar, coffee, cashew, and cotton) exports, the agricultural industry contributes significantly to the country's foreign exchange earnings⁷².



'African smallholder farmers are eager to learn and to do more for the sector but it seems as though government policies and prices/ implementation makes it difficult for the farmers to thrive. Especially produce prices that the government offers do not motivate the farmers to do better. Some smallholder farmers still need a lot of training on how to run their farms etc but through experience, many are succeeding.'

Mariana Jumbe- Smallholder farmer - **Malawi**



70 FAO 2015. www.fao.org/family-farming/themes/small-family-farmers

71 Indexmundi, 2020. https://www.indexmundi.com/tanzania/agriculture_products.html

72 Nations Encyclopedia. 2016 <https://www.nationsencyclopedia.com/economies/Africa/TAnania-AGRICULTURE.html>





25%

OF TANZANIA'S
GDP IS DEPENDENT
ON AGRICULTURE.



64.9%

POPULATION IS
EMPLOYED IN
AGRICULTURE

Overview of Agriculture: Current realities

Tanzania's economy is dependent on agriculture, which accounts for nearly one-fourth of the country's GDP. **More than 88% of the country's population are in the agriculture labour force and about 85% of the country's export is agriculture**⁷³. The agriculture sector's recent transformation is presenting opportunities for increased development, job creation, and poverty reduction.

The government intends to include private sector participation, such as the Southern Agricultural Growth Corridor of Tanzania project, a public-private partnership to boost regional investment. **Furthermore, the government is focusing on research in collaboration with local institutions to create the capacity required for long-term agricultural development.**

As a result of private sector investment and policy initiatives, the agriculture market is expected to expand during the forthcoming years. All these are great initiatives but still lack successful models to inspire smallholder farmers.

Challenges

In Tanzania, agriculture experiences myriads of challenges that range from natural to human-induced problems. Some of the challenges are government's input, lack of modernised infrastructure and practices, inadequate funds, climate change, flood, and drought.

However, the government has been trying to minimize poverty and increase productivity with the introduction of recent initiatives. Some of these initiatives are The Country Programming Framework (CPF) of 2017-2020 and The UN Development Assistance Plan (UNDAP II) of 2016-2021⁷⁴.

Nonetheless, lots of subsistence farmers still find it difficult to acclimatize with the new trends because of low farmer training and lack of capital. Since agriculture is not experiencing any landmark growth, resultant effects are noticed in unemployment, hunger, malnutrition, starvation, and increased death rates. As much as agriculture relates to the economic sectors, lower productivity means lower GDP rate.

Opportunities

According to a World Bank report, the presence of medium-scale farms in a district generally builds and deepens markets for agricultural inputs and outputs by enhancing local demand, which attracts suppliers. As a result, small-scale farms were more likely to use improved seed and fertilizer, cultivate a larger proportion of their landholdings, and access agricultural extension services and credit in areas where there are more medium- and large-scale farms.

The report shows that the 368,000 medium-scale farms added in Tanzania between 2008 and 2014 created 13 million days of additional work annually for hired workers, and US\$225-300 million in net backward and consumer link⁷⁵.

Transformation in the agriculture sector can offer desired economic growth. Recent signs of transformation in Tanzania's agricultural sector offer encouraging opportunities for acceleration of growth, job creation and poverty reduction, if urgent steps are taken to improve the sector's policy and regulatory environment and investments.

73 AA 2020. <https://www.aa.com.tr/en/africa/unlocking-potential-of-tanzanias-smallholder-farmers/1749472>

74 The World Bank, 2019. Kenya Economic Update: Transforming Agricultural Productivity to Achieve Food Security for All

75 <https://www.fao.org/tanzania/programmes-and-projects/en/>

The current trends in agriculture offer a tremendous opportunity to catalyze private investment, both local and foreign, and raise the incomes of the poor and smallholder farmers⁷⁶.

Since agriculture already accounts for a quarter of total GDP and two-thirds of jobs, it can⁷⁷ be expected in future years that enhanced agricultural growth will create more and better jobs and alleviate poverty.

Overview of youth in agriculture and tech

The largest growth in employment is agriculture; other sectors are trade, restaurants, and hotels. Recently, agriculture employs about 64.9 percent while industries and services take 6.81% and 28.32% respectively⁷⁸. **Other promising sectors are agro-processing, textiles, metalwork, vehicle repairs, and manufacturing garments, leather products, and furniture.** Among the 47% of youth working, only 21% were formally employed and the remaining were informally or self-employed. About half of the unemployed youth were looking for work.

By taking up agri-business activities, the youth have helped to increase their household incomes. Young female farmers have shown more interest and excel in agri-business activities that are less labor intensive

than agricultural activities generally associated with masculinity. The same research shows that women are keen to take up such agri-business activities because they allow them to boost their household incomes with ease. A project launched called OYE (Opportunities for Youth Employment) in collaboration has been set to help youth in Tanzania to sustainably increase youth employment and incomes⁷⁹.

Youth involvement can be scaled up by providing disadvantaged youth in rural areas with life skills, relevant technical training, linking youth to market opportunities for employment and enterprise development. The government and private-sector should create opportunities in agric-tech sectors that have concrete potential for employment creation for youths.

AgriProFocus Tanzania is a group working with young farmers and other stakeholders to contribute to a more and better enabling environment for young agripreneurs. They are carrying their functions by encouraging youth debates and learning platforms in agriculture, showcasing young and passionate young farmers, and linking young entrepreneurs to business opportunities in Horticulture, Agricultural Finance and Livestock⁸⁰.



76 Xinhua Net, 2019. www.xinhuanet.com/english/2019-12/03/c_138603120.htm

77 The World Bank, 2019. Tanzania's Agriculture Sector Offers Fresh Opportunities for Accelerated Poverty Reduction

78 Statista 2020. <https://www.statista.com/statistics/44731/employment-by-economic-sector-in-tanzania/>

79 SNV 2017. Young agri-business group in Tanzania: "Yes we can!"

80 Agrifocuz 2020. <https://agriprofocus.com/youth-in-agribusiness-tnz>



UGANDA

Overview of country information

Uganda, once known as the “pearl of Africa,” has been hampered by dictatorship and civil war due to its substantial natural resources. Although Uganda has recently made considerable progress and has become more peaceful, stable and prosperous.

Uganda has an area of 241,550.7 (sq km), of which 41,743.2 sq km are open water and swamps while 199,807 sq km is land. This non-increasing asset is scarce for the growing population given the number of purposes for which it could be used for. Increased pressure is leading to land fragmentation which neither encourages the use of improved technology nor commercial farming. This, therefore, limits transformation of agriculture⁸¹.

Agriculture is the core industry and the largest employer in Uganda’s economy. More than 80% of the women in the sector are employed and contribute about 75% of farm production⁸².



81 Uganda Bureau of Statistics, 2018. Page 21, https://www.ubos.org/wp-content/uploads/publications/04_2018Agriculture_Sector_Gender_Statistics_Profile.pdf

82 New Agriculturist, 2012. <http://www.new-ag.info/en/country/profile.php?a=2414>



70%
OF THE
POPULATION
IN UGANDA ARE
EMPLOYED IN
AGRICULTURE



24%
OF UGANDA'S
GDP IS FROM
AGRICULTURE

Overview of Agriculture: Current realities

Agriculture plays a major part in the Ugandan economy, accounting for about 24% of the GDP and more than half the export earnings of the country (54%; EMF World Bank, 2019). Nearly 70% of employed people are involved in agriculture and that is also the first job for three quarters of people aged 15 to 24 years⁸³. Ugandan rural population is about 78%, where farming is the predominant economic activity⁸⁴.

At the same time, agro-processing including food/drinks, leather processing, cotton ginning, textile and leather manufacture is the backbone of the manufacturing sector accounting for approximately 60% of its total output⁸⁵. Cereals are the main crop type and the major cereal crops are maize, finger millet and grain sorghum while other crops, plantains, cassava, and potatoes are mainly produced for domestic consumption.

Uganda is a leading global coffee producer; however, tea, tobacco and cotton are also important. In terms of production volume; rice,

maize and potatoes have recorded the highest growth mainly as a result of area expansion. After drought-resistant seed varieties are placed on the market, maize and rice are expected to further grow.

Challenges

Agriculture is the most critical economic sector to most Ugandans and the most essential to growth in general. However, it faces several structural challenges, including the predominance of farmers with a low-yield, reeled agriculture; increasing population density on arable land; insecurity in tenure; lack of access to financial resources; poverty; poor infrastructure and low educational achievement. The growth of the agricultural sector is well below population growth, with low adoption rates of improved technologies. Over the last two decades, growth in total agricultural productivity has been negative.

Low connectivity, low access to finance, a lack of reliable inputs, little or no market information and a lack of reliable outlets for products are the main reasons for this. The main challenges in Uganda for agricultural industries have been identified by President Yoweri Kaguta Museveni as low commercial agricultural levels, lack of links between researchers and farmers, low fertilizer utilization, low irrigation cover, low value added, high financing cost, lack of farm machinery, vector and sickness, and the poor transport network⁸⁶.

Opportunities

The government is working with the private sector to speed up the transformation of Uganda into a middle income country and, above everything, to ensure that millions of agricultural households live well on agriculture.



Most technological innovations require literacy levels which many farmers lack'

Mariana Jumbe - Smallholder farmer - **Malawi**



83 ILO 2020. https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_737648.pdf&sa=U&ved=2ahUKEwiW0aer6oLwAhV5gf0HHcU7CVEQFjAMegQIDxAB&usq=AOvAwO4wruTCDY4CIZWHqOTqzy

84 International Growth Centre, Fowler and Rauschendorfer, 2019. Page 3. <https://www.theigc.org/wp-content/uploads/2019/11/Fowler-and-Rauschendorfer-2019-working-paper.pdf>

85 International Growth Centre, Fowler and Rauschendorfer, 2019. Page 3. <https://www.theigc.org/wp-content/uploads/2019/11/Fowler-and-Rauschendorfer-2019-working-paper.pdf>

86 The State House of Uganda, 2016. President names 10 challenges to agriculture in Uganda



The National Resistance Movement (NRM) has embarked on a privatizing process. In order to help investors implement their plans and to advise the government on investor-friendly policies and structural measures, the Uganda Investment Authority (UIA) was created.

There are a number of investment incentives, there are also other benefits such as a rich base of raw materials and access to growing regional and home markets. Oil seed production and processing, cotton production, mining, spinning and weaving, animal production and processing, fruit and vegetable production and added value with regard to coffee and grain are some of the investment opportunities in agriculture and agro-processing.

Since 2015, The World Bank has been leveraging local agri-tech startups to help 150,000 farmers receive electronic vouchers for inputs and services.

Scaling up Uganda's agro-tech startup services will enable 450,000 farmers hire tractors, use solar-powered irrigation, receive soil test results, receive mobile-based precision agricultural advice, access timely credit through mobile wallets, and sell their harvests through e-marketplace platforms⁸⁷.

Overview of youth in agriculture and tech

Even though Uganda's economic growth rates have been relatively high over the previous decade, formal employment creation has been less than the growth rate. There remain challenges to bridge the gap between economic growth and job creation and to tackle the growing joblessness among young people in particular. The creation of decent jobs for these fast-growing youth workforce is a challenge which Uganda's development agenda has accorded a high level of priority.

Robust government job creation is essential in order to absorb young people who enter the employment market and to curb an already high youth unemployment rate. Ugandan youth economic possibilities in agricultural fields through the Feed-The-Future program had been sought by the US Agency for International Development (USAID) via the Youth Leadership for Agriculture Activity (YLA).

The activity aimed at increasing revenues and building entrepreneurship, management and readiness skills for employees. This also enabled the company to generate job opportunities for young people, especially for women, which, in turn, served YLA's objectives of empowering youth, boosting the

economy, and encouraging gender equality and social integration in farming⁸⁸.

One of the latest agritech contributions to agriculture in Uganda is from Grainpulse, a Ugandan supply chain platform for farmers. **The startup has partnered with the International Finance Corporation (IFC) and the Private Sector Window of the Global Agriculture and Food Security Program (GAFSP) to raise \$11 million.**

The aim is to strengthen farmers' supply chain, increase food production and economic growth in the country. The agritech startup, Grainpulse has also planned to launch an online platform for farmers to easily access information on best practices. They will also provide training for agro-input dealers and retailers on financial management skills to help them expand and secure access to finance⁸⁹.

87 The World Bank Group, 2020. <https://www.worldbank.org/en/topic/agriculture/overview#3> , <https://projects.worldbank.org/en/projects-operations/project-detail/P145037>

88 USAID Feed The Future Uganda Youth Leadership for Agriculture Activity, 2020. <https://www.usaid.gov/sites/default/files/documents/1860/Feed-The-Future-Youth-Leadership-for-Agriculture-Lessons-Learned-and-Recommendations.pdf>

89 Afrikan Heroes, 2019. Ugandan Agritech Startup Grainpulse Raises \$11M To Link Farmers To Fertilizer & Markets



NIGERIA

Overview of country information

The Federal Republic of Nigeria is a food deficit country and the most populous country in Africa with an estimated population of 209 million as of 2021⁹⁰ and among the largest in terms of land area (923,770km²)⁹¹. According to the Food and Agriculture Organization (FAO), Nigeria has approximately 74.5 million hectares of available agricultural land, about half of which is currently being utilized. Nigeria's GDP growth rate has been consistently positive since 2016, further boosted to 2.2% in 2019⁹².

Prior to independence, Nigeria had a significant agricultural sector, however that has since declined and the country has moved toward heavy dependence on imports for food⁹³. The Nigerian economy, one of Africa's largest, is dominated by the oil industry, which is the government's key source of revenue.

The economy has diversified in recent years, the non-oil sector including the agriculture sector now contributes significantly to the GDP of the country.



90 NPC 2021, Nigeria's Population 2021

91 Food and Agriculture Organization (FAO) 2021, Nigeria CountryStat

92 World Bank (2020); Nigeria World Bank Data

93 ibid



36%

OF NIGERIA'S
WORKING
POPULATION
IS EMPLOYED IN
AGRICULTURE



LEADING
PRODUCERS
OF RICE
IN AFRICA

Overview of Agriculture: Current realities

Agriculture accounted for about 27% of Nigeria's GDP in 2020⁹⁴, compared to an average of 14% of GDPs across Sub-Saharan Africa⁹⁵. The sector employs up to 36% of the country's working population, more than 80% of these people are smallholder farmers⁹⁶.

Nigeria's primary crops are rice, wheat, maize, cotton, soybeans and cassava. Rice remains an essential staple for most Nigerians, with around seven million tonnes consumed annually⁹⁷. **The country is Africa's leading producer of rice. Yet, the overall farm yield in Nigeria is well below the African average.**

Nigeria is one of the largest importers of rice globally and one of its largest consumers, despite the government's efforts to reduce rice imports. **Nigeria is also the largest global producer of cassava, producing around 50 million metric tonnes annually.** Both crops are grown predominantly by smallholder farmers, who sell around 80% of their harvest.

Challenges

Since the 1970s, agriculture in Nigeria has faced numerous challenges that have resulted in low yields and post-harvest losses. These include resource shortages (limited access to inputs supply, inadequate irrigation, and harvesting systems), violent conflict (nomadic herdsman conflict with crop farmers and conflict in food producing states), outdated system of agriculture (limited adoption of modern technology). Absence of value addition and supply-chain linkages, insufficient supply to meet population growth and food demand, and lack of access to finance have exacerbated the situation, leaving Nigeria, a former agricultural powerhouse, with low agricultural productivity compared to its neighbours⁹⁸.

Opportunities

Over the years, Nigeria's agricultural sector has seen numerous developmental initiatives to improve the yields and food security in the country. The weak fundamental challenges are still preventing farmers from benefiting from

the programs such as poor rural infrastructure which ranked among the worst in the world in the 2018 Global Competitiveness Report from the World Economic Forum⁹⁹; some of the new technologies remain unappealing to farmers in Nigeria because they are cumbersome to those who control less than 1.7 hectares of farmland. Careful rural infrastructure development will particularly improve the productivity of the smallholders in the rural areas and evidently scale their output.

African agri-tech entrepreneurs are now interested in how smallholders farmers work and how they can help improve yields.

The barrier of entry into farming technology has dropped, as more digital solutions such as cloud computing, computing systems, connectivity, open-source software, and other digital tools have become increasingly affordable and accessible. **Entrepreneurs can now deliver solutions to small-size African farms at cost models that farmers can afford.**

The government can address the agricultural challenges in Nigeria by investing in agriculture's fundamental necessities and partnering with the private sector to

94 National Bureau of Statistics (2020)

95 World Bank Africa GDP Data

96 PWC (September, 2020), Current State of Nigeria Agriculture and Agribusiness Sector.

97 Russon, M. (12 April 2019), Boosting rice production in Nigeria. BBC.

98 World Bank Africa GDP Data

99 WEF. 2018. 'The Global Competitiveness Report 2018' (<http://www3.weforum.org/docs/GCR2018/05FullReport/TheGlobalCompetitivenessReport2018.pdf>)



drive more inclusive investments. **Public infrastructure for agriculture remains in dire need of government funding.**

The government also needs to partner with private sectors operators to use PPPs to achieve scale – other sectors demonstrate the potential of PPPs to do this.

Overview of youth in agriculture and tech

Nigeria prides herself in having one of the highest concentrations of young people in the world. In 2020, the UN projected about 43% of the Nigerian population is children (0-14 years), 19% are between 15-24 years and about 62% are below 25 years¹⁰⁰. **Despite the teeming young population, Nigeria's youth unemployment rate stood at 14.2%¹⁰¹ which is more than the population of Rwanda and several other African countries.**

Agriculture presents a unique opportunity for Nigeria's youth, not only because it is the largest contributor to GDP in most African countries, but also because it continues to experience significant growth. However, youth remain uninterested in agriculture.

This trend is further highlighted by the ageing farming population in Africa. Available data from Nigeria reveals that the current average age of a farmer is between 55 and 60 years.

The deployment of emerging technologies in agriculture is driving youth inclusion into the sector. Young people are more ready and eager to master these new technologies and apply them to agriculture to increase productivity and solve challenges. At the same time, these technologies can help demonstrate to youth that agriculture can be a viable and profitable business opportunity, increasing the desirability of agriculture related career paths. Nigeria has one of the most active agritech ecosystems in Africa along with Kenya and Ghana, collectively accounting for 60% of active agritech startups in Africa¹⁰².

Youths are championing digital solutions that address some of the key agricultural challenges in Nigeria. Notable mentions include AFEX, Farmcrowdy, ThriveAgric, Agromall, and Releaf among others.



100 UN Population Division (2020)

101 <https://www.statista.com/statistics/812300/youth-unemployment-rate-in-nigeria/>

102 Shapshak, T. (9 May 2018), African Agri-tech Start-ups Boom With 110% Growth Since 2016. Forbes.

THE INNOVATORS



To leverage Africa's growing youth demographic, agriculture must be made appealing as a career path. Through branding, we change the rhetoric of a farmer being poor and uneducated. Farmz2U's Ambassador program and FFT(Food For Thought) challenge are some mediums through which youth engagement in agriculture is scaled.



Startup: Farmz2u
Founder: Aisha Raheem
Location: Nigeria

Overview:
Farmz2U is an ag-tech startup that provides technology solutions to farmers and end-consumers.

Innovation:
It employs artificial intelligence (AI), machine learning and enterprise databases in providing functionality that achieves two primary objectives; reducing food waste and enhancing nutritional management.

Smallholder Farmers Reached:
2000-5000

Website:
www.farmz2u.com

Social Media Page:
Social Media Page: Facebook; Farmz2u
Instagram:@Farmz2u **Twitter:**@Farmz2u



Organization: Farmcrowdy
Founder: Onyeka Akumah
Location: Nigeria

Overview:
Farmcrowdy is a global Agtech company focused on helping stakeholders in the food value chain maximize their output and increase their profits with technology. This gives the farmers the capacity to farm more acres and by extension leads to increased food production and security in Africa.

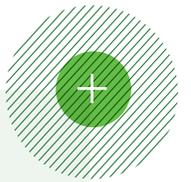
Innovation:
Farmcrowdy's game-changing platform (Farmgate) leverages technology to connect over 420,000 food value

chain participants within their network with access to finance. It also helps to reduce the cost of production, open market access and allows farmers to harvest better yields - all in one place..

Smallholder Farmers Reached: 1m+

Website:
www.farmcrowdy.com

Social Media Page:
Social Media Page:
Facebook; FarmCrowdy
Instagram:@farmcrowdyng
Twitter:@farmcrowdy





GHANA

Overview of country information

Ghana has a population of about 31.5million¹⁰³ with a land area of 23,853,900 ha¹⁰⁴ , agricultural land accounting for 65% of the land area and a GDP of about USD 67.34 billion in 2020 (a per capita GDP of 2,190 USD in 2020)¹⁰⁵ .

The population growth rate has seen a steady decline from 2000 and currently stands at 2.15%¹⁰⁶. In Ghana, the agriculture sector was the main driver of GDP growth, recording 8.3% in Q3, 2020. It should be noted that Ghana's GDP growth which has been consistently positive since 2018 further rose by 6.5% in 2019¹⁰⁷.

The key exports are cocoa, timber, precious minerals, horticulture produce and fish. Cocoa is the major agricultural export of Ghana, and the country is the second largest exporter of Cocoa globally. Cocoa drives Ghana's economy. In 2019, it is reported that Ghana produced over 800 thousand tons of Cocoa¹⁰⁸.



- 103 <https://www.worldometers.info/world-population/ghana-population/>
- 104 FAO 2016 GHANA country data
- 105 2020 Ghana Stats
- 106 Ibid
- 107 World Bank (2020); The World bank in Ghana
- 108 Statista, 2021, <https://www.statista.com/statistics/497844/production-of-cocoa-beans-in-ghana/>



17%

OF GHANA'S GDP IS CONTRIBUTED BY AGRICULTURE.



52%

OF GHANA'S POPULATION ARE ENGAGED IN AGRICULTURE

Overview of Agriculture: Current realities

The Agriculture sector contributes about 17% to Ghana's GDP. Even though Ghana's agricultural sector is well-placed to contribute to the attainment of Ghana development goals, its growth performance has been erratic. This irregular performance is driven by variable rainfall and cocoa production and price fluctuations including international prices of export commodities such as cocoa¹⁰⁹. **More than half of the country's workforce (52%) are currently engaged in agriculture¹¹⁰.**

Crop farming constitutes the largest share of Ghana's agricultural GDP compared to livestock production, with cocoa, oil palm, coffee, and rubber ranking as the most significant crops. In recent years, growth in non-agricultural services and other industrial sectors has outpaced that in agriculture. **Agriculture, nonetheless, continues to grow at a strong pace (e.g., 8.4% in 2017), thanks, in part, to government support via a number of interventions¹¹¹.**

Challenges

Ghana is faced with a bitter reality, a decline in agricultural productivity continues to threaten the economic development of the country.

Smallholder farmers lack access to the financial support they require to improve their yield. Urbanization efforts in the country have also led to more non-farm jobs.

This has reduced Ghana's agricultural competitiveness by increasing the need for imported foods. Farmers in remote areas have no/limited access to information and how to process the information gathered like crop rotation, the use of fertilizer, etc., farmers are unable to understand due to illiteracy¹¹².

Limited access to fertilizers, poor transportation and storage facilities are also contributing to the decreased productivity in the sector. All of these challenges have contributed to decreased youth participation in agriculture.

Opportunities

The agriculture sector is a key contributor to Ghana's export earnings, and it is the major employer of labour in the rural areas. Agriculture is the primary driver of rural employment especially for the poor, with the sector employing over 40% of the population¹¹³. Agriculture and agribusiness hold a major share in the country's economic activities, and two-thirds of non-oil manufacturing depends on agriculture for raw materials¹¹⁴. There is potential for the sector to drive economic diversification in Ghana.

The government's agriculture initiatives show a willingness to revamp the sector and support farmers. Through the Planting for Foods and Jobs (PFJ) program, the government wants to promote food security, provide jobs, and improve farm productivity. **The government in partnership with development finance institutions such as the International Fund for Agricultural Development are implementing many agric-focused initiatives** aimed at helping rural farmers improve farm and off-farm activities.

109 ibid

110 FAO website (<http://www.fao.org/ghana/fao-in-ghana/ghana-at-a-glance/en/>).

111 ibid

112 IFPR October 2019: Ghana Economic and Agricultural Transformation

113 Ifpri, June 2019: Employment, diversifying rural livelihoods, and youth: Lessons for Ghana from the 2019 Global Food Policy Report

114 World Bank Group (2018); 3rd Ghana Economic Update



Public Private Partnerships provide an opportunity to develop Ghana's agriculture sector.

Agriculture is a viable driver of economic diversification in Ghana. Ghana is the second largest exporter of cocoa and it serves as a major source of its foreign exchange.

The country captures 20% of the global cocoa market share but it processes 15% of its cocoa beans into finished goods, and the final consumer goods market for cocoa is worth \$87bn¹¹⁵. A focus on cocoa processing and value addition, and investments encouraging entrepreneurial activities will create a viable diversified economy for the country. Besides cocoa, other major crops are in roots and tubers (yam and cocoyam), maize and cassava. The human factor. Agriculture employs over 40% of people living in rural areas in Ghana. Many of the smallholder farmers still engage in rudimentary agriculture, and this contributes to the low-yield challenge. Developing the capacity of the smallholder farmer and farms includes providing access to finance, education, introduction to digitisation services, and technical know-how.

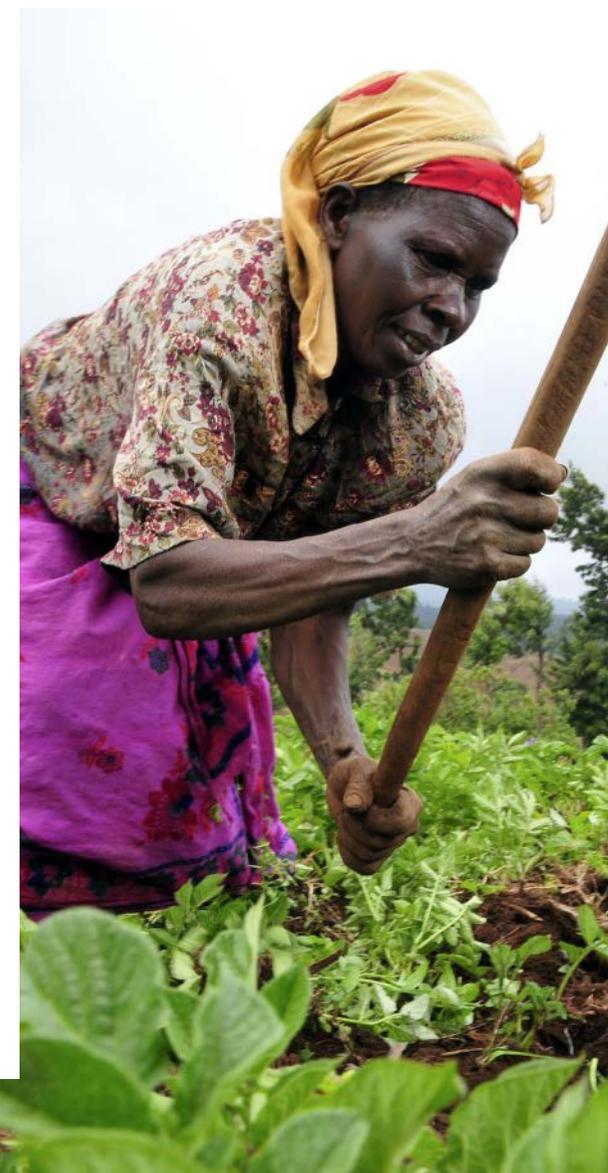
Overview of youth in agriculture and tech

Ghana's youth policy defines youth as anyone between the ages of 15-35¹¹⁶. The youth make up 35.9% of Ghana's population, and are faced with unemployment challenges.

The unemployment rate of youths in Ghana stands at 9.46%¹¹⁷. The youths are a critical demography to Ghana's economic growth through agriculture. The average age of smallholder farmers in 55 years, and the life expectancy is between 55-65 years. The youths can be positioned to reshape agriculture in the country. The urbanisation of the country as well as the narrative of farmers being poor are a contributing factor to the youths' lack of interest in the sector.

In a bid to encourage youth participation in agriculture, the Ghanaian government launched the Youth in Agriculture Program. Besides encouraging youths to embrace agriculture, the program has other objectives of producing food using modern methods and generating enough income to meet farmers needs¹¹⁸.

Agri-tech startups in Ghana are changing the narrative with startups like Agrocenta connecting stakeholders in the staple food value chain. AcquahMeyer uses precision agriculture to provide insights on water management and disease prevention. Esoko uses high-tech digital tools to help smallholder farmers maximize production. In Ghana, agri-tech startups have the potential to make agriculture more attractive to young people, and increase its contribution to the GDP.



115 Marie Noelle Nwokolo, 2020, Ghana's Great Agricultural Opportunity
104 FAO 2016 GHANA country data
105 2020 Ghana Stats
106 Ibid
107 World Bank (2020); The World bank in Ghana
108 Statista, 2021, <https://www.statista.com/statistics/497844/production-of-cocoa-beans-in-ghana/>

THE INNOVATORS

'Larmies Techtronics is of the strong conviction that 21st-century agriculture must be youth-led and technology driven because smart agricultural practice is the surest way of feeding the ever-growing global population'



Startup: LarmiesTechtronics
Founder: Ernest Larmie
Location: Ghana

Overview:

LarmiesTechtronics is a tech company that designs and manufactures electronic devices that help in solving agricultural problems.

Innovation:

In collaboration with Alscarecrowthey have been able to design and build a drone and a stationary sound for scaring birds in rice farms.



Agriculture innovation is the assured means of improving farming in Africa, and also the only bait to get more youth into farming since it makes farming attractive to the youth.



Also, in partnership with Eden Lab, they are developing device that will help mushroom farmers to boost their yield.

Website: www.e2lab.tech

Social Media Page:

Instagram: @larmieernest



Organization: Agroinnova
Founder: Moses Mallaghan
Location: Ghana

Overview:

Agroinnova deploys a suite of software tools and technology-enabled platforms which help to streamline businesses across the agricultural sector.

Innovation:

AkokoTakra is a poultry farm management software which enables poultry farmers to record, analyse and make data driven decisions on their farms using a smartphone or laptop. They also created FBSInnova to assist smallholder cocoa farmers

and others in the daily application of Farmer Business School tools to their business

Smallholder Farmers Reached: 13,000

Website:

www.agroinnovagh.com

Social Media Page:

Social Media Page:

Facebook;

Agro Innova Ghana

Instagram:

@agroinnovaghana

Twitter:

@agroinnovaghana



SENEGAL

Overview of country information

Senegal is a western African country laid on the plains around the North-Atlantic Ocean, Guinea-Bissau, and Mauritania. The country has a total land area of 192.530 sq km of which 46% is used as agricultural land. Out of this estimate about 29.1% constitutes permanent pasture while only 17.4% is arable. Out of the 16.1 million estimated population, 70% of the inhabitants are rural dwellers ¹¹⁹.

The economy of the country is based on agriculture and other sectors like mining, tourism, and construction. Senegal earns its major export income from agricultural products and fish. Watermelons, groundnuts, rice, cassava, maize, sorghum, millet, onions, sugar cane, and vegetables are major crops planted and processed in Senegal.

Fishing is also a major part of the country's agribusiness. Agriculture sector in Senegal employs about 77.5% of the total population¹²⁰.



119 CIA 2021. <https://www.cia.gov/the-world-factbook/countries/senegal/>

120 CIA 2021. <https://www.cia.gov/the-world-factbook/countries/senegal/>



40%

OF SENEGAL'S
AGRICULTURE
IS GROUNDNUT
CULTIVATION



150k

SENEGALESE ARE
SMALLHOLDER
FARMERS

Overview of Agriculture: Current realities

Agriculture is a primary sector in Senegal. About two-thirds of export revenues come from agriculture. Also, more than 70% rural population depend on agriculture for food and livelihood¹²¹. **Agriculture contributes almost 19% to the GDP of the country**¹²². Approximately 150,000 people are smallholder farmers in Senegal. Most of farming in Senegal is subsistence. Much of the government's involvement and subsidies in agriculture is directed to groundnut production. This is because groundnut takes 40% of the cultivation in Senegal¹²³.

Challenges

Despite significant economic growth and decades of political stability, Senegal still encounters serious development challenges. More than one third of the population lives below the poverty line, and 75 percent of families suffer from chronic poverty¹²⁴. Poverty and food insecurity are particularly prevalent

in rural areas in the north, east and south of the country. This is because much of urbanisation is focused on west Senegal.

The agriculture sector is dominated by subsistence farming, with limited access to good quality seeds and fertilizers, technology, finance and credit, agricultural insurance and post-harvest storage techniques.

Farmers still focus on traditional and unsustainable agricultural practices like overgrazing and bush fires which in turn contributes to land degradation. Climate change is also closely associated with rural poverty and under-development. Seventy percent of the crops are rain-fed and the sector is highly vulnerable to climate shocks, which contribute to unavailability and increased prices of food.

The lack of employment and business opportunities in agriculture is a driver of migration, urbanization and emigration. Those left behind, especially women, children and the elderly, are particularly exposed to food insecurity and other risks.

Gender inequalities also plague Senegal's agricultural sector. Women produce about 80% of the country's food yet they are not as empowered¹²⁵.

Opportunities

Despite agriculture's importance, Senegal lies within the drought-prone Sahel region, with irregular rainfall and generally poor soils. As a result, Senegal relies on imports to meet approximately 70 percent of its food needs. Top agricultural imports in Senegal are rice, wheat, corn, onions, palm oil, sugar, and potatoes. Sauces, mixed condiments, seasonings, and beef and beef products may have export growth potential for U.S. suppliers interested in the Senegalese market. Due to this, President MackySall's economic program focuses on agriculture as an engine for development and envisages investing \$4 billion in agriculture. The agricultural plan calls for massive investments in irrigation and rural roads, access to finance through the creation of a Guarantee Fund, the construction of storage facilities, the development of the fishing sector, and the

121 The World Bank, 2016. <https://www.worldbank.org/en/news/press-release/2016/05/17/world-bank-smallholder-farmers-in-senegal-receive-support-to-improve-agricultural-productivity>

122 Nations Encyclopedia, 2010. <https://www.nationsencyclopedia.com/economies/Africa/Senegal-AGRICULTURE.html>

123 New Agriculturist. www.new-ag.info/en/country/profile.php?a=530

124 WFP 2020. <https://www.wfp.org/countries/senegal>

125 IFAD 2016. <https://www.ifad.org/en/web/operations/country/id/senegal>



creation of an agricultural stock exchange market. Increased commodity output would also stimulate the demand for processing technology and growth in the packaging industry. There are plans for a cereal (import oriented) and fruit (export oriented) terminal and associated warehousing facilities in the Port of Dakar.

Overview of youth in agriculture and tech

Increase in demand and the need to facilitate the economy are some of the results of rapid population growth. If the population is growing and the economy is not growing, it may result in low GDP. Youth ages in Senegal is 15-24 years and they account for about 20% of the country's population¹²⁶. Likewise, about 20% of young people in Senegal are unemployed¹²⁷.

Center for International Research, Education, and Development (CIRED) understands that youths are the future of a nation because they have essential skills to contribute to the country's economic development. The Feed the Future Senegal Youth in Agriculture of 2018 was launched to leverage the skills, confidence, and knowledge of youths in Senegal.

The two major means of carrying out the project is to institutionalise sustainable positive youth development and introduce vocational training to build dynamic, profitable entrepreneurship, and employment opportunities for youth. The focus is to ensure their involvement in the agricultural sector and market at large¹²⁸.

Bayseddo was also launched in 2016. It is a network for farmers, especially young farmers and investors in Senegal to optimise agriculture through digital technology. By 2017, a year after the establishment, Bayseddo won the CTA's Pitch Agrihack. The initiative will help to modernise traditional agriculture practice to give it a greater scope through digital technology.

The initiative now boasts of about 84 investors. By 2025, Bayseddo hopes to have integrated the use of drones for optimising farming¹²⁹.

Agritech is helping to seize the potentials in the youth, coming up with the project Engaging Rural Youths from all over the world to identify a core set of challenges that should be overcome for youth to create or seize decent work opportunities in rural areas and to reverse the rural exodus.

Within the framework of the project, steps were taken to explore examples (MIJARC/IFAD/FAO, 2012) showing how one or more of these core challenges were successfully addressed.



126 Center for International Research, Education, and Development. <https://cired.vt.edu/programs/feed-the-future-senegal-youth-in-agriculture.html>

127 IFAD 2016. <https://www.ifad.org/en/web/operations/country/id/senegal>

128 Center for International Research, Education, and Development. Feed the Future Senegal Youth in Agriculture | Center for International Research, Education, and Development | Virginia Tech

129 CTA 2018. Bayseddo: a digital platform to boost agriculture in Senegal



MALAWI

Overview of country information

Malawi is landlocked in Southern Africa, sharing its boundaries with Mozambique, Zambia and Tanzania. As of January 2021, Malawi estimated its population to be more than 19 million, with 52.2% young people between the ages of 15 and 64, 7.52% unemployed and 61.94% employed¹³⁰.

Despite major economic and structural reforms to sustain economic growth, Malawi remains one of the world's poorest countries. The economy depends heavily on agriculture, with nearly 80% of the population involved in agriculture and is susceptible to external shocks, especially weather shocks¹³¹. In Malawi the agricultural sector has usually been divided into two principal sub-sectors: smallholder and estate. Approximately 2 million farm families comprise smallholder farmers and cultivate approximately 4.5 million hectares of land.

The production of smallholders is majorly subsistence, that is, low input and low output levels characterize it. Roughly 25% of smallholders grow under 0.5 ha on average; 55% grow less than 1.0 hectares; 31% grow from one to two hectares and 14% farm more than 2 hectares. Although resources are scarce, small-scale farmers produce 80% of Malawi's food and 20% of its agricultural exports¹³².



130 United Nations Department of Economic and Social Affairs: Population Division, 2021. Malawi population (2021) live — Countrymeters

131 The World Bank in Malawi, 2021. Malawi Overview

132 Food and Agriculture Organization (FAO) of the United Nations, 2015. MALAWI



75%
OF THE
POPULATION
LIVE IN RURAL
AREAS WITH
SMALL FARMS



50.7%
LIVING BELOW
THE POVERTY
LINE AS AT 2016



2.5m
RURAL HOUSEHOLDS
ARE FARMERS
REPRESENTING
90% OF THE RURAL
POPULATION

Overview of Agriculture: Current realities

Malawi is considered to be one of the world's poorest countries (World Bank Data, 2017) where agriculture depends heavily on the economy (mainly on subsistence of the majority of the population) and crop diversification is less important. **Maize is still the most important crop in the South African country. Agricultural intensification and diversification that benefits the whole population is a need expressed by all stakeholders.**

In Malawi, 75% of the total population live in rural areas and depend on agriculture (maize production predominantly) with 50.7% living below the poverty line in 2016. Malawi farms are small farms and the effects of climate change, instability of the economy, and policies have made most of the rural poor extremely vulnerable. Due to policies like the 1967 Land Act which transfers the land from a smallholder sector to the estate sector and increases the birth rate, the size of these farms has declined drastically over many years to about 0.5 ha per capita.

Development of Malawi is deeply rooted in agriculture and was crucial for the eradication

of poverty, especially as the impact of the structural adjustment program resulted in the decline of the manufacturing sector.

However the transformational potential of the agriculture-based economy is challenged by socio-economic factors like HIV/AIDS prevalence, high mortality rates, low diversification, low value-added agriculture and inequalities.

Because of its contribution to the GDP and the workforce, agriculture is the main pillar of Malawi's economy. It accounts for approximately 82.5% of the foreign exchange profit and 80% of the workforce. It accounts for around 37% of GDP. The character of agriculture is a dual structure of commercial properties which are largely concerned with the growing of cash crops and a large small-scale farming sub-sector. About 2.5 to 3 million rural households are farmers with customary land tenure, representing over 90% of the rural population. **Some 60% of smallholders are net buyers of maize and only 10% are net sellers. Smallholder farmers are mainly subsistence-based and are distinguished by the cultivation of small and fragmented landholdings.** More than 80 percent of the 2.4 million hectares cultivated by small farmers are planted with maize. Roughly 25% of smallholders grow under 0.5 ha on average;

55% grow less than one hectare; 31% grow from one to two hectares and 14% farm more than two hectares. Despite their resource poverty, smallholders produce around 80% of Malawi's food and 20% of farm exports. The land for cultivation in tobacco, tea, sugar or coffee is mainly freehold or leased. Tobacco is the largest export cash crop in Malawi with more than 50% of export earnings and tea and sugar follow. Malawi produces about 3 million tons of maize, above the 2.3 million ton autonomy level¹³³.

Challenges

Malawi has been working to develop agricultural markets in recent years through increased liberalization, rural marketing and information systems development on the agricultural markets, and commodity exchange. **The agriculture sector is below its capacity, although there is potential for better production and productivity.** This continues to put the country in a state and household situation in food shortages. Malawi was also affected in recent times by falling armyworms, which have had a major impact on maize production. Sectoral challenges include vulnerability to weather shocks, poor land, water and soil management, low use of agrarian technologies, lack of continuity in markets in rural areas, poor access to finances

and farm inputs, low mechanization and technical labor skills, limited market price information for farmers, a limited irrigation system and weak ties to markets.

The irrigation potential of the country remains underused, despite being one of the priority issues in national agricultural politics, **only about 116,249 hectares (29%) were constructed for irrigation purposes in 2017/18 out of the estimated potential of approximately 407,862 hectares.** This trend has a negative impact on farm growth, exports, food and food safety¹³⁴.

Opportunities

There are a number of opportunities for Malawian agriculture. Opportunities to improve crop production and animal husbandry, market systems and access, soil and fertility management and infrastructure development are significant. The presence of short to medium term trappings of productivity also allows 'vicious circles' to be transformed into 'virtual spirals' if resources can be efficiently and consistently mobilized for addressing key causes of these traps.

Local demand is growing and the local economy increases significantly as non-traditional food crops, such as horticultural crops, are being produced. In comparison to the food or cash crops consumed outside the local economy, the revenue flows resulting from these activities tend to have dense networks in the local economy. Promoting these horticultural crops offers the agricultural sector untapped opportunities.

Investment opportunities also exist on different scales in agro-processing industries. In Malawi, the majority of agro-processed products are imported, which provides an opportunity to replace them. In addition, increasing supermarkets, especially in urban areas, offer additional opportunities for connecting small farmers to supermarkets supplying horticultural products and processed agricultural products, through aggregation mechanisms and structures.

Meanwhile, the huge amount of land and labor invested nationally in small-scale farming means that there is a more widespread potential for relatively low growth in the entire sector than for higher growth rates in much smaller areas or sub-sectors.

The large number of poor farmers and workers in agriculture, the importance of food costs in poor people's budgets, and the importance of food for their nutrition also mean that these growth can have very large, pro-poor, and welfare impacts. Further opportunities may emerge from agricultural potential to benefit from climate change funds, for example through payments for carbon sequestration to fund the development of organic soil content because this would benefit soil fertility, soil moisture holding capacity, and cultivation¹³⁵.

Overview of youth in agriculture and tech

The largest and fastest growing share of Malawi's population are young people. As of January 2021, **52.2% of the population was between 15-64 years of age¹³⁶. The population of Malawi is largely young with 80% less than 35 years of age and a median of 17¹³⁷.**

FAO's mandate is to increase nutrition, increase agricultural productivity, enhance rural life and help the world economy grow. The FAO has worked during the past four decades on strengthening and expanding the capacity, knowledge and skills of young people (through education and training) and

134 Japan International Cooperation Agency (JICA) Malawi Office Section Paper, 2020. <https://www.jica.go.jp/malawi/english/activities/c8h0vm00004bpzlh-att/agriculture.pdf>
135 International Food Policy Research Institute (IFPRI), Malawi Strategy Support Program, 2015. <https://reliefweb.int/sites/reliefweb.int/files/resources/masspwp13.pdf>
136 Worldometer 2021. <https://www.worldometers.info/world-population/malawi-population/>
137 ILO. https://www.ilo.org/wcmsp5/groups/public/---ed_emp/documents/publication/wcms_228279.pdf

creating rural jobs in supporting youths and young agricultural producers. Strategic Objective Three of FAO's New Strategic Framework 2010–2019, "Reduce Rural Poverty", recognizes that rural youth should be treated as a priority group when it comes to accessing decent employment opportunities.

The Agricultural Productivity Program for Southern Africa (APPSA), a regional program for Malawi, Mozambique and Zambia, was therefore established to increase availability of improved agricultural technologies through: the establishment of Regional Centers of Leadership (RCoLs) on commodities of regional importance, regional collaboration in agricultural research, technology dissemination, and training, and increased sharing of agricultural information, knowledge, and technology among participating countries.

After seven years, there have been significant changes, with more than 4.6 million people benefiting from the project in all the three countries. In Mozambique, one million beneficiaries were reached, while the project reached about 1.3 million in Zambia, and nearly 2.4 million in Malawi¹³⁸.



138 World Bank Group, 2020. Farmers in Malawi, Mozambique and Zambia Adopt Agriculture Technologies to Improve Yield, Efficiency



ZAMBIA

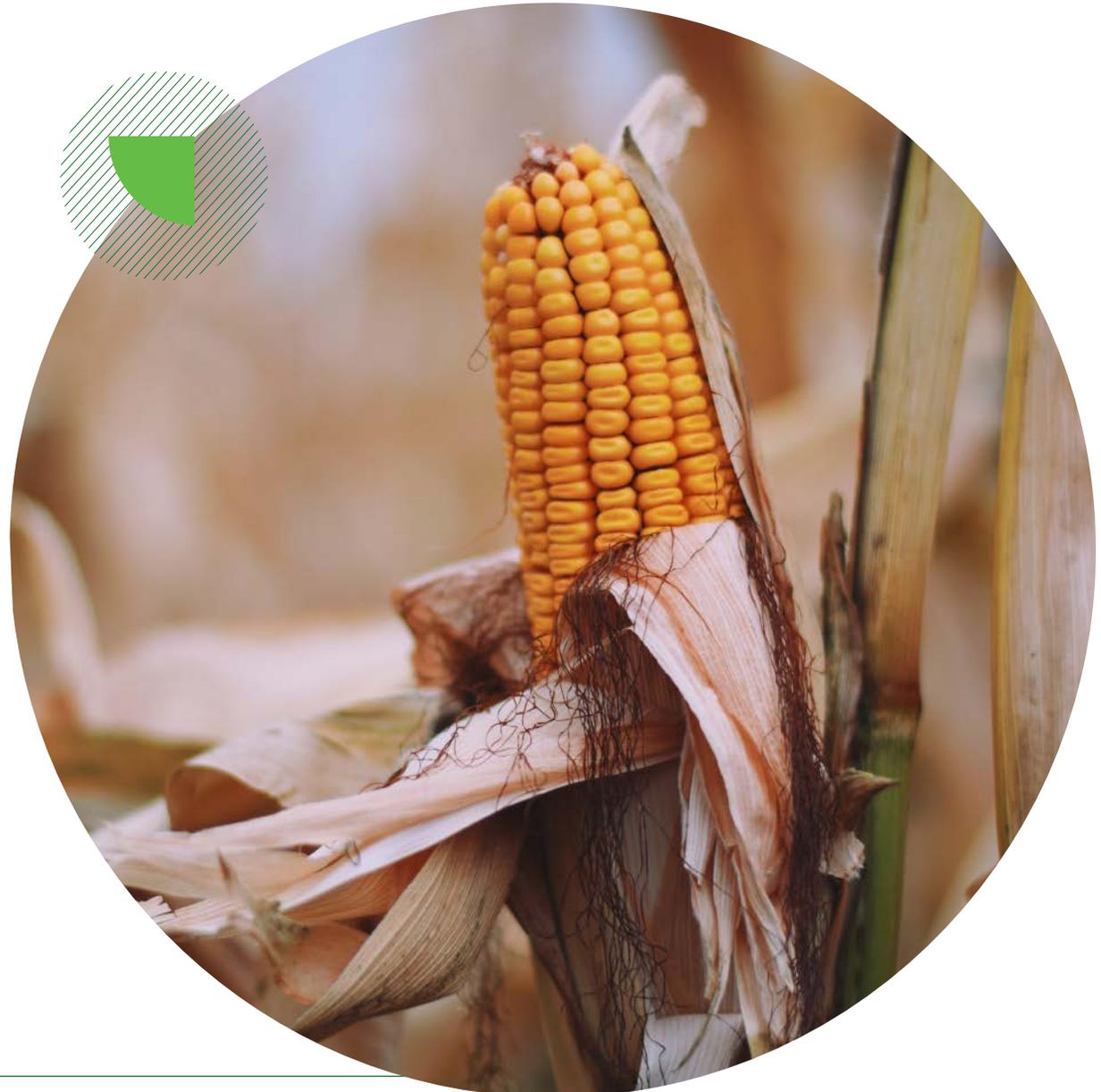
Overview of country information

Zambia is a large, landlocked, resource-rich country with sparsely populated land¹³⁹. Zambia is located in Central Southern Africa with an area of 752,618 sq km. Approximately 31.7% of the land area in Zambia is used for agriculture.

Only about 4.8 is arable. The population of Zambia is about 19.1 million. The country is experiencing a large demographic shift and most of the population is urban-based. It is estimated that the population will experience a yearly increase of 2.8%¹⁴⁰.

Overview of Agriculture: Current realities

Given the large expanse of arable land and abundant rainfall in Zambia, the country can enjoy an economic boom from agriculture. In Zambia, agriculture activities are mostly small scale, medium scale and large scale. **The sector deals with crops, fish, and livestock. Agriculture contributes to about 20% of the country's GDP with an employment rate of three-quarters (54.8%) of the total population.** Crops like maize, cassava, and millet are the major domestic crops in Zambia. Export crops are sugar, rice, groundnuts, soybeans, cotton, and horticulture produces (cut flowers and roses)¹⁴¹.



139 The World Bank 2021. <https://www.worldbank.org/en/country/zambia/overview>

140 CIA 2021. <https://www.cia.gov/the-world-factbook/countries/zambia/>

141 International Trade Administration 2020. <https://www.trade.gov/country-commercial-guides/zambia-agriculture>



31.7%
OF THE LAND AREA
IN ZAMBIA IS USED
FOR AGRICULTURE



20%
OF COUNTRY'S
GDP IS FROM
AGRICULTURE



1.5m
OF THE POPULATION
ARE SMALLHOLDER
FARMERS WHO ARE
WOMEN

Smallholder farmers are about 1.5 million of the population of which 20% of them are women. Most of them practise subsistence farming and they are unable to afford agricultural inputs or capitals to expand their farming¹⁴².

Challenges

Agricultural productivity in Zambia is lower than expected. Also, there are many challenges that are plaguing smallholders to access needed resources for farming. Despite all its positive predispositions, agriculture in Zambia remains largely underexploited with only 15% of its potential arable land under cultivation. The Zambian fisheries sector currently produces less than half of what it should be producing.

Some other challenges are high cost of inputs, poor rural infrastructure, lack of oxen for ploughing, and the absence of rural financial services — although, there are some forms of limited community-based schemes. These issues make it difficult for smallholders to access needed resources.

Opportunities

The Zambian government seeks to promote agriculture as a way to diversify the economy away from an overreliance on copper. The government is working to develop farm blocks in all ten provinces for large and medium commercial farming, fish farming, and livestock production. Private equity and other investors are active in this sector.

Agricultural cultivation in Zambia is mostly non-mechanized, and the sector is rain-fed. Opportunities include large-scale farming, farm inputs and equipment supply, irrigation systems, agro-processing, and commodity trading. The sector is in dire need of mechanization¹⁴³.

Zambia National Agriculture Policy Draft (2012-2030) aims to tackle the sector's issues through adequate strategies¹⁴⁴. These strategies include: increasing its production and productivity, strengthening agricultural extension service delivery, increasing the area of land under irrigation as well as levels of mechanization among smallholder farmers, improving the efficiency of agricultural

markets for inputs and outputs, promoting accessibility to financing and credits, increasing the private sector's participation, improving food security, and implementing environment-friendly practices¹⁴⁵.

In Zambia, IFAD introduced loans to support the commercialization of smallholder agriculture, in particular by enhancing crop and livestock productivity. They also create links between small-scale farmers and suppliers and market intermediaries, and help to increase access to rural financial services by small-scale farmers¹⁴⁶. The IFAD country strategic opportunities programme is designed to help poor smallholders in remote areas make the best use of natural resources to improve food production and food security.

Overview of youth in agriculture and tech

Zambia has a growing youth population¹⁴⁷. Those who are within 15-24 years are considered as youth in Zambia with a population of about 20.03 % of the total population. Youth do not naturally want to get involved in agriculture.

142 IFAD. <https://www.ifad.org/en/web/operations/country/id/zambia>

143 International Trade Administration 2020. <https://www.trade.gov/country-commercial-guides/zambia-agriculture>

144 FAOLEX DATABASE 2011. <http://www.fao.org/faolex/results/details/en/c/LEX-FAOC174991/>

145 Zambia Invest 2013. <https://www.zambiainvest.com/agriculture>.

146 IFAD. <https://www.ifad.org/en/web/operations/country/id/zambia>

147 The World Bank 2021. <https://www.worldbank.org/en/country/zambia/overview>



Reasons include the perception of agriculture as old and unprofitable, lack of incentives to boost their skills, minimum wage, etc¹⁴⁸. The best way to get them involved is to introduce modern technology for agriculture.

AgriProFocus Zambia is an initiative launched in 2016 to invest in youth's skills through new technologies and opportunities in the field. Also, the project aims to improve the opinions of youth in agriculture. It will also be an avenue for them to engage in more agribusiness opportunities¹⁴⁹.

Since the introduction of this program, more youths have begun to take up agribusiness. The number is increasing especially from urban youth population who are engaging in agricultural production like crop, livestock production, and other agribusiness linkage services¹⁵⁰.

The Development Aid from People to People (DAPP) also introduced the Climate Smart Agriculture and Entrepreneurship for Young Farmers Clubs Project. The essence of this project is to instigate young people's interest and passion in agriculture and harness Zambia's agricultural potential.

The project also aimed at strengthening the capacity of 300 young farmers from the Chibombo region to become more business oriented and develop their capacities in organic farming¹⁵¹.

In 2020, due to the aftermath of COVID-19 on the economy and price of copper, more enabling environments have been introduced for young farmers. The APMEP initiative is financed by the Global Agriculture and Food Security Program (GAFSP), a Financial Intermediary Fund hosted within the World Bank Group. **GAFSP provided \$31.13 million in grant funds to the Zambian government for APMEP, and the African Development Bank disbursed the money and provided technical expertise¹⁵².**

The initiative is part of a longer-term drive by Zambia's government to diversify its economy away from copper. **At its peak, copper accounted for 70% of Zambia's foreign exchange earnings and close to 30% of government revenue. However, since the 2008 global economic crisis, copper prices increased by two-thirds,** prompting the government to invest more in sustainable sectors like agriculture.

APMEP is developing irrigation schemes, intensifying agricultural mechanization, promoting conservation agriculture, crop diversification, and enhanced aquaculture and livestock development in Zambia as part of an integrated agriculture value chain development under the Ministry of Agriculture.

The project contributes to economic growth and poverty reduction by enhancing food security, incomes, and nutrition among participating households.

148 IFAD 2016. <https://www.un.org/youthenvoy/2016/04/why-are-rural-youth-leaving-farming/>

149 AgriProFocus 2016. <https://www.agriprofocus.com/youth-in-zambia>

150 Xinhua 2021. https://www.xinhua.net.com/english/africa/2021-02/19/c_139753155.htm

151 CTA 2017. <https://www.cta.int/en/project/promoting-agricultural-entrepreneurship-among-rural-youth-in-zambia-sid06a445ee6-e775-49fb-ac94-260231f374c2>

152 AFDB Group, 2020. <https://www.afdb.org/en/success-stories/zambia-mine-field-agriculture-project-helps-youth-turn-away-copper-and-live-land-36948>



ZIMBABWE

Overview of country information

Zimbabwe is a landlocked country in Southern Africa that has a total land area of over 39 million hectares in which 33.3 million hectares are used for agricultural practices¹⁵³.

The remaining 6 million hectares have been reserved for national parks and wildlife, and urban settlements. The country comprises four physio-geographic regions, which are the Eastern Highlands, the Highveld, the Middle veld and the Low veld. Zimbabwe borders Botswana, the Republic of South Africa, Mozambique, and Zambia. It has a population of 12.084.304 inhabitants, of which 41.9% are below the age of 15 years¹⁵⁴.

Overview of Agriculture: Current realities

Zimbabwe has a rich history in agriculture. The country's economy is reliant on agriculture. Zimbabweans remain largely a rural people who earn a living from agriculture and other related rural economic activities.



153 FAO 2015. <http://www.fao.org/zimbabwe/our-office-in-zimbabwe/zimbabwe-at-a-glance/en/>

154 FAO 2015. <http://www.fao.org/zimbabwe/our-office-in-zimbabwe/zimbabwe-at-a-glance/en/>



60%
OF THE COUNTRY'S
POPULATION IS
EMPLOYED IN
AGRICULTURE



12%
OF GDP IS
CONTRIBUTED BY
AGRICULTURE

Agricultural activities provide employment and income for 60-70 percent of the population, supply 60% of the raw materials required by the industrial sector and contribute 40 percent of total export earnings.

Agriculture contributes approximately 12% to Zimbabwe's GDP¹⁵⁵. **The cash and food crops produced in Zimbabwe are tobacco, soybeans, cotton, maize, sorghum, groundnuts, vegetable, and horticulture crops (roses and cut flowers)**¹⁵⁶.

Livestock and livestock products contribute significantly to the economy of Zimbabwe, with cattle accounting for 35-38% of the Gross Domestic Product (GDP)¹⁵⁷. **It is estimated that up to 60 percent of rural households own cattle, 70-90% own goats, while over 80 percent own chickens.** The importance of livestock in rural livelihoods and food security lies in the provision of meat, milk, eggs, hides and skins, draught power, and manure. They also act as strategic household investment. Small ruminants (sheep and goats) and non-ruminants, particularly poultry, are an important safety net in the event of a drought – they are easily disposable

for cash when need arises or during drought crises. Zimbabwe's smallholder system has the potential to grow and become the mainstream of the livestock sector's performance indicator.

Challenges

Much of Zimbabwe's economic growth comes from agriculture. As the main source of livelihood for the majority of the population, the performance of agriculture is a key determinant of rural livelihood resilience and poverty levels. General challenges facing smallholder farmers include low and erratic rainfall, low and declining soil fertility, low investment, shortages of farm power - labor and draft animals, poor physical and institutional infrastructure, poverty and recurring food insecurity.

Agricultural production is also vulnerable to periodic droughts. The peasant sector, which produces 70% of staple foods such as maize, millets, and groundnuts, is particularly vulnerable as it has access to less than 5% of national irrigation facilities.

Despite the high level of employment in the sector, it directly contributes only 15-19% to annual GDP, depending on the rainfall pattern (Government of Zimbabwe, 2010), and this is a statistic that understates the true importance and dominance of the agricultural industry. It is generally accepted that when agriculture performs poorly, the rest of the economy suffers¹⁵⁸.

High competition in exports, low contribution of the agro sector in GDP are the biggest constraints for the sector in Zimbabwe.

Also, post production management is the worst in the country, which makes it difficult to transport fresh food on time. Hyperinflation has destroyed the economy of the country, resulting in a weak agro industry¹⁵⁹.

Opportunities

Zimbabwe's agricultural sector is growing due to the steadily rising tourism, increased local and global food consumption, modern technologies, low water requirement in the horticulture process and government's infrastructure programs.

155 Mangwana Capital, 2020. <https://www.mangwanacapital.com/agriculture.html>
 156 International Trade Association 2020. <https://www.trade.gov/country-commercial-guides/zimbabwe-agricultural-sector>
 157 FAO 2015. <http://www.fao.org/zimbabwe/our-office-in-zimbabwe/zimbabwe-at-a-glance/en/>
 158 Mordor Intelligence, 2020. <https://www.mordorintelligence.com/industry-reports/agriculture-in-zimbabwe-industry>
 159 Mordor Intelligence, 2020. <https://www.mordorintelligence.com/industry-reports/agriculture-in-zimbabwe-industry>

Zimbabwe has a large amount of arable land which creates a future for more involvement in agriculture. Likewise, horticulture is a recent trend in agricultural production that is bringing improved agricultural productivity and output. With a moderate population, Zimbabwe is expected to boost its agro sector and generate a high GDP¹⁶⁰.

Overview of youth in agriculture and tech

Zimbabwe is a youthful country, with approximately 67.7% of its 13 million total population under the age of 35 as noted already. Annual population growth rate estimates range from 2.4 to 3%, and projections indicate a population of 23 million by 2030 according to the 2014 Human Development Report.

Young people show little or no interest in pursuing employment opportunities in the agriculture sector. However, digital technologies are rapidly changing the agriculture employment landscape, creating jobs that require a new set of skills and that are more profitable and appealing to the youth.

The agricultural sector is seen as crucial to addressing the disproportionately high levels of youth unemployment, underemployment and poverty. Not only is the sector of vital importance to rural economies worldwide – and particularly in developing countries – it also possesses significant untapped development and employment creation potential.



160 Mordor Intelligence, 2020. <https://www.mordorintelligence.com/industry-reports/agriculture-in-zimbabwe-industry>

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CONCLUSION

The role of agriculture in the continent is closely linked to the social, economic, and environmental bottom line of all countries. The role of youth participation as well as the adoption of smart, African centred Agri-Tech are key determinants to supporting the agriculture sector. The smallholder farmer will continue to play a significant role in feeding the continent.

The role of Heifer International is to position itself as the bridge connecting young people in the space with innovators, governments, non-profits as well as local institutions, with a common purpose of achieving food security across the continent, building a new generation of young tech savvy farmers and other players in the value chain.



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APPENDIX

A link to the following documents

1. [Focus group recordings](#)
2. [Focus group transcripts](#)
3. [Research team](#)
4. [Research questions](#)
5. [Survey database](#)

