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Harnessing science and innovation for increased agricultural productivity and competitiveness in the context of the African Continental Free Trade Area (AfCFTA)

Executive Summary

This document provides a synthesis of key issues and strategies for increasing African agricultural productivity and competitiveness by harnessing science and innovation in the context of the African Continental Free Trade Area (AfCFTA). It delves into the synergy between the latest scientific advancements and innovative practices to propel agricultural productivity and competitiveness as they play a crucial role in shaping the future of agriculture and ensuring food security.

Productivity improvements in African agriculture faces longstanding challenges ranging from limited farm size to unconducive land tenure systems, lack of access to inputs, technologies and innovation, weak technological and institutional capacities, inadequate legal and regulatory frameworks and insufficient transport, storage and marketing infrastructure. In addition, policy-induced constraints resulting from trade and macroeconomic policies have biased the structure of incentives against agriculture and exports. African farmers lack the necessary means to access markets, information on production and market opportunities. Unlocking the full potential of science, technologies and innovation could lay the foundation for the much-needed transformation towards MORE efficient, inclusive, resilient and sustainable agrifood systems, as well as for increased market opportunities for sustainable and inclusive growth and for realizing a vision of the AfCFTA.

Documents can be consulted at www.fao.org

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Suggested actions by the Regional Conference

The Regional Conference is invited to:

a. recognize that science and innovation play a crucial role in boosting agricultural productivity, competitiveness and food security, determining success and instrumentality of the African Continental Free Trade Area;

b. call on countries to:

   i. increase funding for agricultural research and development, focusing on priority areas such as drought-resistant crops, climate-smart agriculture, precision agriculture, and improved storage and processing technologies;

   ii. establish dedicated spaces/platforms where scientists, finance and technical innovators, farmers and entrepreneurs can collaborate to address common challenges, develop shared solutions and facilitate knowledge sharing and technology transfer across borders;

   iii. implement policies that protect and incentivize innovation while ensuring equitable access to knowledge and technology;

   iv. expand access to reliable energy, electricity and stable and reliable internet infrastructure crucial for deploying precision agriculture tools, accessing market information and facilitating e-commerce for agricultural products;

   v. promote public-private partnerships for development and deployment of innovative solutions; and

c. invest in appropriate education, data collection and analysis by strengthening national agricultural information systems and promoting data and information sharing across borders. call on FAO to:

   i. facilitate experience sharing and mutual learning regionally within Africa as well as among regions using FAO's platforms.

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I. Introduction

1. Increasing agricultural productivity and competitiveness for accelerating agricultural growth in Africa is a prerequisite for the overall development of Africa, as the majority of Africa's population depends largely on agriculture. Agricultural growth in Africa lags overall economic growth, and the continent's agricultural performance has fallen behind the other developing regions of the world. The productivity of Africa's agriculture is low as the continent's crop yields have stagnated relative to the rest of the world. Almost half of the labour force works in agriculture and the labour productivity is very low. The agriculture "value added" per worker in sub-Saharan Africa is less than half of the global average.

2. The yields of the main cereal crops have stagnated at less than 25 percent of potentially attainable yields. The low yields are largely attributed to limited access to modern inputs, outdated farming technologies and lack of extension and advisory services, inadequate infrastructure, and low -input use efficiency under rainfed conditions, where climate change and associated climate variability with frequent natural and man-made calamities have reduced crop yields and livestock productivity. In some parts of Africa, low agricultural productivity is associated with adverse climatic conditions which are often associated with transboundary pests and diseases. The low productivity has led to increased food insecurity, poverty and malnutrition, which are likely to worsen as the population grows, unless investment, knowledge and innovation are improved and support to the implementation of the AfCFTA increased. These conditions significantly affected small subsistence farmers, most of whom are women.

3. The poor performance of the agricultural sector has compelled many farmers and other agriculture-dependent communities to engage in practices that degrade land resources, deplete forests and other natural vegetation, and harm marine and other aquatic resources. Nevertheless, agriculture (including crop production, animal husbandry, fisheries and forestry, and processing) will continue to be the most important sector for addressing food insecurity and poverty in Africa, and to stimulate economic growth and enhance economic transformation in Africa through raising rural incomes, creating jobs and increasing government revenue.

4. African agriculture has shown promising signs of progress in recent years, with agricultural productivity increasing by 13 percent on average every year between 2015 and 2020. FAO, through its *better production* Programme Priority Area (PPA),[1] along with its corporate initiatives, like the Hand in- Hand Initiative (HIH) and the 1000 Digital Village-s Initiative(DVI), empowers countries, family farmers and small producers to adopt sustainable practices, technologies and policies. This boosts crop, livestock and forestry productivity while optimizing agricultural systems. Science and innovation have been identified as one of the key accelerators that drive the transformation of agriculture. Therefore, harnessing Science and Innovation for high-quality, highly efficient and diverse sustainable crop production is high on FAO's Better Production agenda.

5. In spite of the many challenges, the long-term prospects for African agriculture remain strong with the AfCFTA Agreement expected to be a game-changer for agrifood systems transformation in Africa, boosting both extra- and intra-African agrifood trade and expanding investments, creating a single market, increasing productivity and competitiveness, as well as reducing poverty and hunger. Projections by the World Bank indicate that the AfCFTA has the potential to raise income in the continent by 7 percent and lift 40 million people out of extreme poverty, mainly by spurring intraregional trade. The AfCFTA offers many additional opportunities for the development of the agrifood sector, including diverse livelihoods and the provision of safe and nutritious food using Africa's own resources, while reducing the reliance on imports.

6. However, to realize the objectives of the AfCFTA, African agricultural productivity must be improved significantly to enhance its competitiveness,[2] both regionally and globally.

[1] https://www.fao.org/strategic-framework/en

[2] An expanded discussion on intraregional trade and competitiveness including various methods of measuring competitiveness can be found in: *Africa Agriculture Trade Monitor 2019*, by Antoine BOUËT, ed., Sunday P. Odjo, ed. Publisher(S): Akademiya2063/International Food Policy Research Institute (IFPRI). https://doi.org/10.2499/9780896296909

7. High trade costs play a disproportionate role in affecting the size of new exporters and the survival of exporters in Africa. Additionally, trade cost differences across African countries are a relevant factor in explaining the lower market diversification of exporters from landlocked countries. A key implication is that the AfCFTA can bring many benefits in terms of export flows and destination markets. However, without improving knowledge and innovation to strengthen productive capacities, the diversification of export products will likely remain limited.

II. Strategies for increasing African agriculture productivity and competitiveness

8. In many African countries, much of the gains in productivity have come through land expansion with very minimal use of yield-increasing technologies. Efforts to increase agricultural productivity and competitiveness should focus on a comprehensive approach through measures to improve yields; promote sustainable intensification of production wherever needed and possible; reduce post-harvest losses with the use of modern science and innovation in the entire value chain from production to consumption; and enhance market transparency. Application of science, technology and innovation in sustainable land and water management is increasingly recognized as one of the viable pathways to accelerate food security, arrest land degradation and address tenure issues.

9. A holistic approach that combines regulatory measures, innovation and sector-specific enhancements is crucial for increasing African agricultural productivity and competitiveness. To increase productivity and competitiveness, the focus should include: i) improving access to resources, inputs, credit and other advisory services, according to the local context and needs of smallholder farmers; ii) enhancing use efficiency of inputs, including efficient irrigation, and improving water productivity nutrients by introducing scientific and innovative methods for reducing the “yield gap”, and by designing optimal cropping pattern and enterprise mix; iii) increasing opportunities for value addition of agricultural products of local and underutilized crops and engaging smallholders in local markets; iv) promoting evidence-based and enabling policies and investment plans to increase productivity of agriculture in Africa, building on existing regional and national policies; v) improving market access, regulations and governance; vi) harnessing information technology; and vii) reforming land ownership with inclusiveness as a driver.

III. Harnessing science and innovation for increased agriculture productivity and competitiveness in the context of the AfCFTA

10. Science and innovation can play a key role in improving productivity and competitiveness of the agrifood sector. Increasing African agriculture productivity and competitiveness is crucial for the continent's economic growth, food security and poverty reduction, but it requires that African countries harness science and innovation to promote: product diversification with nutritious foods; processing to extend shelf life and make healthy foods easier to prepare; improved storage and preservation to retain nutritional value and ensure food safety; and innovations to extend seasonal availability and reduce post-harvest losses and food waste. Innovations such as drought-tolerant seeds, data analytics, veterinary medicine and mobile phone market platforms must be available, scalable and affordable. Moreover, science-based and information technologies should be made available to manage the ever-present risks in agriculture, while improving sustainability and competitiveness.
11. As promising as it is, the AfCFTA is a necessary but not sufficient condition for an effective increase in productivity and competitiveness of the African agrifood sector, as the success of the AfCFTA hinges on overcoming several constraints. None is as critical as the cross-cutting issue of science and innovation. Science and innovation are an essential part of finding solutions to the complex challenge of increasing productivity and competitiveness and addressing the overall agricultural trade challenge brought in by the AfCFTA. In essence, the question is no longer whether science and innovation are fundamental for the transformation of the African agrifood systems and implementation of the AfCFTA, but how to ensure that scientific research capabilities and technology adoption are expanded to accelerate agrifood trade under the AfCFTA.
12. Intra-Africa trade requires innovative storage and cold chain technologies that will ensure that more agricultural products reach markets rather than landfills. Information technology allows farmers to

access vital information on market prices, weather, pests, soil health and precision agriculture, and data management tools help producers reduce costs and conserve scarce resources, thus increasing productivity and agrifood production.

13. FAO has outlined a range of science, technology and innovation options available for increased agricultural productivity in Africa which include: i) farming and cropping systems that increase soil fertility and soil health; ii) irrigation systems that make more effective use of limited amounts of water, and planting food crops that require less water and/or improved varieties that make more efficient use of available water; iii) effective agronomic practices that include optimal dates for planting, as well as planting density; and iv) improved crop varieties that yield more and respond better to improved management practices.
14. Promotion and application of digital technologies, precision agriculture and strengthening of information and communications technology (ICT) infrastructure is critical. Real-time data gathering, through simple mobile apps, affordable drones equipped with basic cameras, can be used to map fields, identify pest and disease outbreaks, and assess crop health, even in remote areas. Expertise and new knowledge sensor technologies and data acquisition, storage and sharing can be used to develop remote food safety and quality inspection. Developing ICT/digital infrastructure cuts across all sectors and can enhance knowledge about production and market information flows between stakeholders in the agriculture sector.

15. Promotion of integrated agricultural innovation systems (AIS) by strengthening national agricultural research systems (NARS) and agricultural extension and advisory services (AEAS) is important for co-creation and improvement of access to appropriate innovation and technologies by smallholders.

16. Improving linkages between agricultural education, research, extension and developing enabling policy and regulatory environments through multi-stakeholder engagement mechanisms, including innovation hubs, could contribute to co-development of technologies and innovations. Well-functioning AIS can ensure that farmers have access to quality seeds, fertilizers and other agricultural inputs and market information to make informed decisions about what crops to grow and when to sell. The AfCFTA can facilitate the establishment of pan-African research centres focusing on developing solutions for shared agricultural challenges across the continent.

17. To make sure our agricultural sector is prepared to meet the challenge of the AfCFTA, there is a need for more innovation in the agrifood sector, while reaping the full potential of existing and new technologies. African member countries should focus on high-impact innovations to increase production and competitiveness, for example: digital technologies for smart production, improving market transparency, and facilitating safe intra-Africa trade; innovative processing technologies to foster intra-Africa trade and enhance the efficiency of food processing; packaging innovations which lengthen the shelf life of food and can reduce food waste; and other technological innovations that can optimize the use of resources.

IV. Role of governments in harnessing science and innovation for increased agriculture productivity and competitiveness in the context of the AfCFTA

18. Although innovation is key for agricultural transformation, including increasing productivity and competitiveness, insufficiency of government funds has hindered their expansion. Some African Members have, however, established national funds for research and innovation. It is essential that all Members adequately prioritize investment in science and innovation, as well as entrepreneurship in their national development strategies, and adapt existing science and innovation policies to support the implementation of the AfCFTA.

19. Governments' science and innovation policies should prioritize investment in public science and innovation and institutions to support the private sector through, for example, tax exemptions. African member countries should provide financial support to public-private sector projects for innovative technologies and include research on agriculture, forestry, fisheries and food production, and technology development for chemical fertilizer, biocides, biological pest control and mechanization. Public investment in infrastructure and institution is essential to support innovation.

20. At the regional level, Regional Economic Communities (RECs) are encouraged to establish regional funds to support existing or new regional centres of excellence in agricultural (forestry, fisheries and food production) priority areas, as well as cross-border research and innovation collaboration addressing common challenges. These funds will drive regional initiatives, reinforce the impact of national initiatives of REC members and ensure wider sustainable innovation.

21. African Members should create an ecosystem to facilitate innovation, by facilitating knowledge and innovation communities. Collaborations between government agencies, research institutions and private companies can drive innovation. Members should mobilize private funding for innovation by fostering well-functioning markets.

22. For science and innovation to contribute to the successful implementation of the AfCFTA, there is a need to empower stakeholders to innovate, while creating and applying knowledge.

V. FAO's role in harnessing science, technology and innovation for increasing agricultural productivity and competitiveness

23. FAO is supporting governments to enable farmers, agribusinesses and non-state actors to promote inclusive and efficient agrifood systems that better integrate smallholder farmers and small and medium agribusinesses into value chains. FAO has developed approaches and tools to support the integration of smallholders and small and medium agribusinesses into value chains. The Organization also provides capacity-building support to strengthen public-private collaboration on sustainable food value chains development, public food procurement, public-private partnerships, responsible contract farming, and improve market access for local products through Geographical Indications.

24. The FAO Science and Innovation Strategy guides action across country, regional and global levels to support the delivery of the FAO Strategic Framework 2022–31 and hence the 2030 Agenda for Sustainable Development.

25. To address the daunting challenges of agrifood systems transformation, particularly in Africa, youth and women must be prioritized. Solutions to current problems should embrace science, technology and innovation and place youth and women at the heart of agrifood transformation, especially in digitalization. Digitalization is rapidly transforming economies around the world and youth are greatly influenced by digital solutions and services. Digitalization is set to influence the way agrifood systems operate. However, the digital transformation process is uneven in geographic and socioeconomic terms, and in many areas youth and women have restricted access to information and communications technologies (ICTs), including smartphones and the internet. In order to correct for the disparities and support youth and women, there is an urgent need to improve access to and knowledge of digital innovations. FAO is emphasizing digitalization and innovation to ensure that agrifood systems are attractive to youth and women and that they possess the necessary skills and knowledge to allow them to use emerging technologies in agriculture. For example, FAO has developed, with partners, a range of apps that can be installed on mobile phones, tablets and computers that allow young farmers to monitor and improve their farm operations, sales and purchases.

26. FAO has launched a report on global investments in agricultural research to advocate for increased public investment and facilitate collaboration through networks and platforms. It also aids countries by providing access to scientific literature through the International System for Agricultural Science and Technology (AGRIS) and the Access to Global Online Research in Agriculture (AGORA/Research4Life) knowledge programmes and partnerships with research institutions.

27. FAO utilizes internal resources and tools like co-development spaces, incubators and innovation hubs to drive and support Members' innovation. FAO encourages research that incorporates both traditional and modern science, exemplified by its publication on community and indigenous climate adaptation strategies.

28. FAO shares knowledge and evidence through platforms, networks and mechanisms, such as the Climate Change Knowledge Hub and the FAO Evidence platform for agrifood systems and nutrition, and thematic technical networks in each region.

29. FAO collaborates with the AfCFTA Secretariat on a project advocating for food security and agriculture in national trade policies, strengthening the AfCFTA Secretariat's capacity, supporting micro, small and medium enterprises and informal cross-border traders, and mobilizing resources for industrial development and intra-African trade.

30. The AfCFTA, with a vast market, presents opportunities for smallholder farmers and businesses in the agrifood value chain. FAO builds on previous work to address new challenges and emphasizes the development of regional value chains in Africa for the AfCFTA's success.

VI. Conclusion

31. In order to realize the full potential of the AfCFTA, there is a need to change the business model, empower science and innovation, and establish more enabling policies. It can be argued that science and innovation promise to provide better options for increasing productivity and competitiveness within the context of the AfCFTA. However, efforts aimed at increasing agricultural productivity must prioritize the continent’s 33 million smallholder farmers and millions of small traders who play a key role in food production, job creation and foster intra-Africa trade. Innovation is a fundamental tool to improve the productivity, efficacy, and social, economic and environmental impact of the agrifood sector.

32. Africa's collective mission must be boosting basic scientific research and development capacities, and unleashing innovation to increase agricultural productivity and competitiveness which boost intra-Africa trade in agriculture.