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Policy options for food systems transformation in Africa - from the perspective of African universities and think tanks

by Fadi Abdelradi, Assefa Admassie, John Asafu Adjaye, Miltone Ayieko, Ousmane Badiane, Katrin Glatzel, Sheryl Hendriks, Mame Samba Mbaye, Fatima Ezzahra Mengoub, Racha Ramadan, Tolulope Olofinbiyi, Simbarashe Sibanda

Abstract

Within the context of the United Nations Food Systems Summit taking place in September 2021, this brief discusses key drivers of food systems in Africa, as well as the challenges and opportunities for transformation. It concludes with specific policy options that could considerably accelerate progress towards the transformation of food systems across the continent. Specifically, this policy brief makes five recommendations: it recommends that investment in research and development for the transformation of food systems in Africa be significantly increased. To do so, it proposes the development of an African funding base to support supranational research activities as well as the creation of policy labs that allow for innovation and experimentation and learning from past failures. Secondly, the policy brief suggests that governments more proactively support the development and use of new technologies, including ICTs and biotechnology. Specifically, digital innovation hubs could provide the innovation ecosystem that is needed to spur the digital transformation of food systems, while research centers can play an active role in the evaluation and impact assessment of specific technologies and e-services in rural areas to ensure that digital applications and services meet quality standards. Thirdly, investment in strong vocational training and skill development at scale as well as integrating the concept of food systems into teaching and curricula will be crucial to harness Africa's youth dividend and ensuring the next generation of African researchers has a deep understanding of the interconnectedness of the different disciplines that constitute food systems. The fourth recommendation made by this brief is to place more emphasis on post-harvest technologies, especially in food processing. Not only do these technologies reduce loss and waste, they add value to crops, make foods more convenient and nutritious, and expedite the commercialization of farmers' production. Finally, the brief recommends that countries commit to strengthening the capacities within institutions and to mutual accountability mechanisms. The CAADP Biennial Review and the joint sector reviews hereby constitute best practice approaches that could be built upon to encompass all elements of a food systems transformation.

1. Introduction

Over the past decade, Africa's food systems have begun to transform, sparked by economic recovery, rising incomes, an expanding middle class, a growing population, rapid urbanization, globalization, and digitalization, among others. These key drivers are inducing fundamental changes in dietary preferences and habits of consumers and corresponding demand for food with responses from the components of food systems, including food production, distribution, and allocation.¹ Yet, the shifts are coupled with a variety of challenges, including changing climate, rapid environmental degradation, low adoption of new technologies, and growing energy deficit, amidst ongoing rising resource-scarcity, limited financial resources as well as socio-economic shocks, including conflicts and prolonged economic crises, migration, youth unemployment, and health crises. Covid-19 has added additional strain on African food systems. Now is the opportunity to re-think and advance African food systems, to be more sustainable, resilient, and inclusive. This brief discusses key drivers of food systems in Africa, as well as the challenges and opportunities for transformation. It concludes with policy actions required to speed up the transformation of food systems across the continent. The discussions are informed by literature and perspectives coming out of leading think tanks and universities in Africa.

Furthermore, the brief will contribute to the UN Food Systems Summit (FSS) being convened in September 2021 as part of the Decade of Action to achieve the Sustainable Development Goals (SDGs) by 2030. The Summit will launch bold new actions to deliver progress on all 17 SDGs, each of which relies to some degree on healthier, more sustainable, and equitable food systems. By generating momentum, expanding the knowledge base, and sharing experiences and approaches, the Summit aims to unleash the benefits of food systems for all people.

2. Drivers of and opportunities for food system transformation in Africa

The main drivers of food system transformation in Africa include sustained economic recovery and rising incomes, rapid urbanization, steady population growth, deepening globalization, and digitalization. Each of these drivers and how they contribute to the transformation of food systems across Africa are reviewed below.

a) Sustained, broad economic recovery and rising incomes

The strong economic recovery observed across the African continent—with considerable growth acceleration since the early 2000s is striking.² Between 2000 and 2014, real per capita GDP has increased by over one-third on average, with faster growth of up to 100 percent or more in some countries.³ Furthermore, GDP per capita is projected to double by 2050. This positive growth trajectory has contributed to reductions in poverty and the emergence of a sizeable, dynamic middle class.⁴ Rising incomes, accompanied by a growing middle class, are shaping the composition of consumer diets, driving an increasing demand for animal-source foods, such as dairy, eggs, and meat.⁵ Between 2000 and 2010, per capita consumption of eggs, meat, and milk in Africa grew by 24, 25, and 47 percent respectively.⁶ By 2050, it is projected that per capita consumption of meat and milk will reach 26 kg and 64 kg per year,⁷ while close to 70 percent of total meat and milk consumption is expected to come from urban areas.⁸ Despite improvements in the quality of diets, hunger and malnutrition levels in Africa have remained high.⁹ While income growth is important for food security and nutrition, it is crucial to ensure that the food demands of high-income consumers are not catered for at the expense of the availability of more affordable foods for low-income consumers.¹⁰

b) Population growth and distribution

Countries in sub-Saharan Africa (SSA) are expected to account for over half of the world's population growth between 2019 and 2050. Further, by the end of the century, the continent is projected to add more than 1 billion people.¹¹ With higher food demand, Africa is experiencing a widening food import gap, which increasingly exposes the continent to price volatility.¹² Moreover, Africa's youth population is growing faster than other age groups, providing an opportunity for a demographic dividend with potentially positive effects on food systems transformation and economic growth.¹³ Meeting the nutritional and employment needs of a growing young population will be key for reaping the demographic dividend. Moreover, the population growth is concentrated in rural areas. A rapid increase in rural density across the continent, particularly in peri-urban centers, is contributing to the transformation of agriculture and diversification of rural economies—thereby influencing the structure of farming.¹⁴ In some countries, the number of medium- and large-scale farms is increasing and in others, they already account for a sizeable and rising portion of total farmland. Agribusinesses and downstream food systems are thus responding to population growth and urbanization in dynamic ways.¹⁵

c) Urbanization

Urbanization across Africa has reached the levels of other regions in the world and has continued to grow at a rate of nearly 4 percent per annum.¹⁶ While there were only two African cities with more than a million inhabitants in 1950, this increased to 50 in 2010 and is expected to nearly double by 2025.¹⁷ However, urbanization is being driven by the emergence of many small cities or rural towns.¹⁸

Africa's total urban food market is projected to reach US\$150 billion by 2030 with potential opportunities for smallholder farmers to capture as much as US\$30 billion. Urbanization in Africa is driving increased demand for processed, ready-to-cook, or eat foods, such as couscous, millet flour, and garri (cassava flakes) and ultra-processed foods. By 2040, the share of processed foods is expected to increase five to tenfold compared to 2010, and will account for nearly 75 percent of the demand for staple foods. However, urbanization and the associated changes in consumer lifestyle and diets can increase overweight and obesity.¹⁹ There is a widespread increase in consumption of refined or highly processed foods, as well as of sugar, salt, fats, and oils.²⁰ At the same time, growing attention to public health and diets presents opportunities to decrease the prevalence of obesity, diet-related chronic and non-communicable diseases, such as diabetes and heart diseases.^{21,22}

The emergence of the food processing sector is accompanied by a lengthening of agricultural value chains.. From traditionally short chains limited to home-based processing and confined predominantly to rural areas, the changing value chains now primarily supply small towns and large urban centers with a range of branded ready-to-cook or eat foods. Urban-based value chains are fueled by the introduction of new processes of producing and distributing traditional foods outside of the household setting through specialized enterprises.²³ This offers new employment opportunities in processing, distribution, packaging, and marketing across food value chains, as well as increased incomes for farmers. Strengthening the links between producers and processors is important to facilitate firm growth and benefit smallholder farmers.²⁴

d) Globalization, large-scale food industry, and trade

Globalization and the growth of the large-scale food industry, including the rapid development of supermarkets, are driving changes in the supply and demand of food. Moreover, trade policies and processes, which facilitate or mitigate the expansion of trade are contributing to the globalization of food trade and increasing the demand for food quality and safety standards.²⁵ These drivers are closely linked with urbanization, rising incomes, and a growing middle class, as changing environments and preferences interact to influence dietary patterns.²⁶ Domestically, the need to feed Africa's growing cities are reshaping farmers' access to markets, starting with those closest to towns and moving outward into remote areas. The rise of secondary cities is expanding market access and extending value chains into previously hard-to-reach areas. To harness the benefits afforded by greater domestic, regional and international trade, it is necessary to raise the productivity of smallholder farmers and improve the quality of their produce.

e) Digitalization and growing agri-tech industry

Finally, digitalization has significant potential to improve efficiency, equity, and environmental sustainability in food systems across Africa.²⁷ The use of digital and data-driven technologies at each segment of agriculture value chains can guide and support decisions on production methods, value chain optimization, and storage methods to avoid food waste and loss.²⁸ For many farmers, access to output and input markets has increased as a digital revolution is allowing markets to connect faster.²⁹

The private sector is already playing a major role in accelerating the development of promising technologies and solutions in the food and agriculture sector. Innovation funds, often in the form of grants, are now being used to create platforms for innovative activity by providing incentives to improve collaboration and the quality of services offered. Between 2016 and 2018, US\$ 19 million was invested in agriculture technology in Africa and agri-tech startups grew by 110 percent. Placing digitalization at the center of food systems transformation strategies and policies will be key to harness its cross-cutting innovative power.³⁰ Moreover, data derived from digitalization efforts offer opportunities to design better-informed policies for food systems transformation at scale.

3. Threats and challenges to the transformation of Africa's food systems

A new optimism has emerged about the potential of food systems transformation in Africa. Yet, African food systems continue to face several challenges, including low levels of investment in agriculture and food systems, climate change, environmental degradation, limited adoption levels of yield-increasing technologies, slow adoption of biotechnology, and energy deficit.

f) Climate change and environmental degradation

Climate change is a major risk to food systems transformation. It presents significant challenges to African agriculture and threatens recent progress in increasing productivity and reducing poverty and hunger. The combination of rising temperatures and changing precipitation patterns are projected to result in a broad range of impacts, including increases in the frequency of weather volatility and extreme weather events, rising sea levels, changes in the incidence of agricultural pests and diseases, adverse effects on crop productivity, and a general decline in the production of several key crops in the coming decades.³¹ By 2050, climate change is expected to leave more than 38 million more people at risk of hunger in SSA than would otherwise be the case, particularly in Eastern Africa. In addition, more than 4 million children under five years of age are projected to face malnutrition.³²

Policies and practices that promote adaptation to rapidly changing climate conditions are urgently required. A key intervention is the adoption of improved agricultural technologies for sustainable intensification.³³ Widespread adoption of climate-smart practices, such as integrated soil fertility management, drought- and heat-tolerant crop varieties, integrated crop-livestock management, and conservation agriculture should also be encouraged.^{34,35} While these climate-smart agriculture practices show promise in terms of higher productivity and improvements to food security, their adoption by smallholder farmers in SSA is constrained by limited access to inputs and information, markets, and risk-management tools. Major investments in research and technology coupled with institutional and physical infrastructure are therefore needed.³⁶

Even though the intensification and homogenization of food systems have contributed to increases in per capita agricultural outputs, they have resulted in major degradation of soils and loss of biodiversity around the world, including in Africa.³⁷ Several studies show not only the significant impacts of degradation on agricultural production in SSA (hence threats to future food security), but also the need for solutions that are tailored specifically to local agro-ecological conditions and farming systems.³⁸ Ensuring food security and safeguarding biodiversity should not be seen as incompatible goals, but rather as synergetic given the interdependence between agriculture and biodiversity as well as the important role that each plays in preserving the other.^{39,40}

g) Limited adoption of improved production technologies

The expanded use of modern inputs, such as improved seeds, irrigation, and mechanization, have significant potential to accelerate food system transformation, but the intensity of input use in Africa still lags behind that of other regions.⁴¹ Africa has the least mechanized food systems in the world: farmers have 10 times fewer mechanized tools per farm area than farmers in other developing regions, and access has not grown as quickly as in other regions.⁴² However, some countries have experienced more dynamic growth in mechanization, by emphasizing equipment rental or service hiring markets, such as in Ethiopia and Malawi, and by improving the environment for public-private partnerships to

thrive.⁴³ Mechanization in African food systems needs rethinking and fresh strategies. Its success will not only be about technology, but also organizational innovations, such as reliable services and cooperation arrangements for and with farmers. Opportunities for mechanization must be harnessed at each stage of the agricultural value chain, and when done right, can and should be employment-enhancing and need not be labor-replacing.⁴⁴

Irrigation use is also low in Africa. Yet, evidence shows that average yields on irrigated areas are 90 percent higher than in nearby rainfed areas.⁴⁵ Investments in irrigation are also one of the key factors that stimulated agricultural productivity growth during the Green Revolution in India.⁴⁶ Expanded investments in irrigation must be coupled with better policies for the sustainable use of available water resources. By adopting high-efficiency irrigation technologies or by improving water management practices, water-use efficiency can be increased.⁴⁷ An example is the Pedal Pump (PEP)—a mechanical irrigation tool for tapping into wells, rivers, lakes, or even small ponds, to facilitate water supply to farms and homes— which is already being used in some African countries.⁴⁸ The pump does not depend on fossil fuels and only draws relatively small amounts of water. An average of 60 liters can be extracted per minute from a depth of 3 meters using the pedal pump. According to a study in Tanzania, through the use of PEP, the average farm size was tripled, 58 percent of farmers had diversified their crops and doubled their yield, on average.⁴⁹

h) Slow adoption of biotechnology

Biotechnology, including improved seed varieties, has not been widely embraced across Africa. Increased support for the adoption of biotechnology, particularly among smallholders, requires attention.⁵⁰ Through crop biotechnology and genomics, scientists are designing and developing crops with higher yields, additional nutrients, and enhanced tastes. The power of modern agricultural biotechnology and genomics in transforming African food systems into a force of economic growth, creating wealth in the rural space and beyond, feeding a growing African population and conserving resources for future generations cannot be ignored. Despite challenges and uncertainties surrounding the adoption of biotechnology, there appears to be a significant potential for capturing large economic, social, and environmental benefits from its use across Africa.⁵¹ In West Africa, for instance, farmers can benefit significantly from the adoption of Bt Cotton. However, the share of farmers that stand to gain from the introduction of Bt cotton technology will be largely influenced by whether or not governments and technology innovators support appropriate incentives and address the institutional and socio-economic barriers that may limit the benefits to be captured by smallholder farmers. Knowledge flows to and from farmers will play a critical role in the proper deployment of biotechnology.⁵² Furthermore, building the technical expertise in Africa to harness and safely deploy biotechnology for communities and the environment will be important.

i) Energy deficit

Currently, Africa faces the highest costs of electricity provision in the world, and large shares of the population, particularly in rural areas, remain unconnected to energy grids.⁵³ Recent figures show that 580 million people in Africa still lacked access to electricity in 2019.⁵⁴ Policies that explore promising off-grid and mini-grid solutions that can meet the needs of smallholder farmers, agro-industries and households in remote areas should be explored.⁵⁵ Expanding access to alternative sources of energy, such as solar, wind, and biogas, can help boost food security across the continent by stimulating sustainable agricultural development, improving water security, thereby accelerating rural and economic growth.⁵⁶ Zambia's commitment to strengthen and diversify its energy supply through fiscal incentives, including reduced import duties, is noteworthy. The country has taken a cluster-based approach to agricultural electrification through "farm blocks" that are equipped with basic infrastructure and complemented by industrial cluster zones for agricultural processing. To meet

increased energy demand and connect rural areas to electricity, the government seeks to expand electrification using a combination of grid extension and off-grid solutions.⁵⁷

4. Policy options for sustainable transformation of African food systems

This brief has discussed some of the main drivers behind food system transformation in Africa including sustained economic recovery and rising incomes, rapid urbanization, steady population growth, deepening globalization, and digitalization. Based on this, actionable interventions are being proposed below to address the challenges that African food systems face and to harness the opportunities to accelerate food systems transformation and overall progress on the implementation of the SDGs and the African Union Agenda 2063.

The brief emphasizes the importance of evidence based-policies that understand and harness the synergies and trade-offs between food, health, water, energy, and ecosystems, that provide alternative solutions for agricultural extension and advisory services and promote organizational innovations at production, industry, and downstream levels of supply chains that are lean, agile, resilient, and green.

Comprehensive and differentiated policy reforms for integrated food systems across Africa as well as improvements in governance and management for better outcomes are critical.

#1 Leveraging African research and science

Food systems transformation is a relatively new concept. As such, investment in research and development for the transformation of food systems in Africa needs to be significantly increased. One option is to **develop an African funding base to support supranational research activities.**

Think tanks and research institutions need to be considered public goods that foster continued dialogue and supply of innovative approaches and solutions to the challenges that the food systems face. Crucially, African research institutions need to be equipped to support governments in developing their own evidence-based policy priorities and science, technology, and innovations for food systems transformation, coupled with scalable solutions. This ought to occur in tandem with continued exchange and constructive dialogue with other regions in the world to improve public policy. The need for permanent dialogue and exchanges calls for the **creation of policy labs that allow for innovation and experimentation and learning from past failures.**

#2 Harnessing new technologies

The use of modern technologies, such as improved seeds, irrigation, and mechanization technologies, breeding techniques, and digital services have significant potential in contributing to increased agricultural productivity and food systems transformation, but their uptake in Africa still lags behind that of other regions.

Increased support for the adoption of biotechnology – for example, Bt cotton - particularly among smallholder farmers needs to be on top of governments' agendas. For example, through crop biotechnology and genomics, scientists are **designing and developing climate-smart crops with higher yields, additional nutrients, and enhanced taste that are also drought and heat resistant.** Knowledge flows to and from farmers will play a critical role in the effective and sustainable deployment of

biotechnology. Connecting farmers to information and communication technology (ICTs) will play a crucial role in this.

Hence, the digitalization of the agriculture sector needs to be placed at the core of national agricultural growth and transformation agendas to harness its cross-cutting innovative strength. Key benefits of digitalization include greater access to information and services, including finance and links to markets. At its simplest, ICTs enable farmers to digitize farm operations: farm management applications can give farmers an overview of their farm processes at the touch of a button, and expedite decision-making as a result. At the other end of the scale, more complex technologies and platforms are redefining how stakeholders along the value chain and across public, private, and civil society sectors work together to transform the whole sector. For example, the use of the internet of things (IoT) can automate the generation of large amounts of data, thereby enabling easier and faster analysis of matters such as land degradation, drought, and infrastructure utilization and improve the design of effective policies.⁵⁸

By developing national digital agriculture strategies along with required public investments, governments can set out solid long-term visions for the design, development, and use of new technologies along the agriculture value chain.

Digital innovation hubs create the innovation ecosystem that is needed to spur the digital transformation of the agriculture sector, while providing opportunities and support for young people in the development of locally suitable technologies and digital solutions. **More investment and support need to be provided to create more innovation hubs across the continent** that are dedicated to developing solutions focused on food system transformation.⁵⁹

To ensure digital applications and services meet quality standards, **research centers can play an active role in the evaluation and impact assessment of specific technologies and e-services in rural areas.** This would allow governments and the private sector to bring to scale those programs and interventions that are proven impactful and beneficial to rural communities. Quality control and standard-setting of new technologies, digital tools, and services require the attention of business associations and governments.

#3 Strengthening training and education

The persistent gap between skills and available jobs also explains why Africa's youth often resort to employment in the informal rather than the formal sector. Without increased attention to and **investment in strong vocational training and skill development at scale**, African governments will be unable to harness the opportunities of their youth dividend.

In Morocco, strengthening technical education and vocational training is a key element of the Plan Maroc Vert. A network of 52 institutions with 24 different curricula has been set up across the country to improve the uptake and efficiency of agribusinesses. Furthermore, eight secondary schools prepare young people for the baccalaureate degree in agricultural sciences as well as 30 middle schools in rural areas dedicated to training young people in agricultural technology. All agricultural vocational training institutions provide apprenticeships to improve the employability of rural youth who are not in school, but have basic literacy skills. Each year, 10,000 young people receive training in 20 professions.⁶⁰

In Egypt, partnerships between universities and the private sector gained interest and support from the government to develop programs that reduce the gap between market needs and the capacities and skills of graduates. Consequently, Egyptian Universities have started to promote training on entrepreneurship, critical thinking, and communication skills among students through introducing

related courses in the curricula. Furthermore, incubators were set up at universities to support graduates to establish their business start-ups. A total of 21 faculties of agriculture and one higher education institute for agricultural cooperatives, as well as a national center for agricultural research, are spread across the country to produce professionals in agribusiness and production engineers. At the high school, technical training for agriculture is the fourth largest with a growth of 15 percent over 2016-2020.ⁱ

Moreover, without new skills and transdisciplinary knowledge, traditional and informal education, and training, systems will not adequately spur development for a sustainable transformation of Africa's food systems at scale. For example, at present, only 2 percent of students in Africa are enrolled in agricultural programs at universities, compared with 26 percent who study humanities. At the secondary school level, agriculture or nutrition has been introduced as a compulsory or optional subject in some countries. However, in most countries, agriculture- and nutrition-related training does not feature in the schools' syllabus, and where it does, a strong focus is placed on agricultural production. Other important post-production aspects are not included, and neither are the technical skills needed for animal breeding, machine handling, and repair, or agripreneurship, leading to a roadblock in the growth and expansion of food sector-related industries, especially in rural areas. Moreover, the concept of food systems needs to be integrated into teaching and curricula to equip future professionals with the necessary knowledge and deep understanding of the interconnectedness of different disciplines. In addition, training needs to be provided to broaden the understanding of the concept amongst researchers and scientists already working on one aspect of the food system. Future research grants can shape this by funding research in this field.

#4 Upgrading interventions to catalyze the benefits of the processing sector

Rapid urbanization across Africa is driving demand for processed, ready-to-cook, or eat foods – in fact, African food markets are expected to grow sixfold by 2025, with most of the expansion being driven by urban demand for processed staples. Through novel processing techniques, losses at the post-harvest stage can be reduced, food safety standards improved and demand for nutritious foods unlocked, including demand for indigenous crops that are otherwise at times difficult to process and domesticate. New technologies, if adapted to local contexts and needs, can result in increased farm incomes, improved livelihoods for smallholder farmers, and new employment opportunities, particularly for women, who continue to dominate the informal food processing and trading sectors.

Governments must prioritize new technologies and the provision of infrastructure along the entire food value chain. This requires substantial investments in the design and development of technologies that improve the quantity and quality of food. Going hand in hand with the necessary skill development, more emphasis should be placed on post-harvest and in particular processing technologies that help increase the commercialization of farmers' production by adding value to crops while improving nutrition outcomes and making foods more convenient but nutritious. This initially requires a supportive fiscal regime in which sales taxes are low and barriers, such as import duties on technologies, spare parts, and raw materials for local manufacturing, are minimized.

Within the context of integrated approaches, new technologies have the potential to facilitate the commercialization and increase the consumption of neglected yet nutritious crops (such as Canarium Indicum nuts, Marama, and Bambara). Although some of these crops are nutritious and drought resistant with the ability to produce a reasonable crop even when grown in poor soils, they are not

ⁱCAPMAS report on student enrollment in 5 years, 2020.

often produced in sufficient amounts. As many of these crops are harvested by hand, post-harvest losses remain substantial. Moreover, the manual processing of crops is very time-consuming.

#5 Capacity strengthening of institutions and mutual accountability

Governments must be held accountable for their commitments to invest in integrated approaches and food systems transformation. Critical for this remain mutual accountability country processes, including the CAADP biennial reviews and the agriculture joint sector reviews. Mutual accountability will be crucial for improved policies and better outcomes on food system transformation and ensure that policies respond to the needs of all stakeholders, including the vulnerable and marginalized.

To deliver on the ambitions and targets set out under the African Union Agenda 2063, CAADP and the SDGs, capacities for implementation, monitoring, and evaluation need to be strengthened. Poor institutional capacity has been identified as one of the major barriers to the successful implementation of the Programme. Countries will, therefore, need to invest more in building the requisite capacities to transform agriculture and food systems and commit to inclusive, technically rigorous, and comprehensive mutual accountability processes. The biennial review and the joint sector reviews hereby constitute best practice approaches that could be built upon to encompass all elements of a food systems transformation

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The authors are:

Fadi Abdelradi Faculty of Agriculture, Cairo University

Assefa Admassie Addis Ababa University

John Asafu Adjaye The African Center for Economic Transformation (ACET)

Miltone Ayieko Tegemeo Institute of Agricultural Policy and Development, Egerton University

Ousmane Badiane Akademiya2063

Katrin Glatzel Akademiya2063

Sheryl Hendriks University of Pretoria

Mame Samba Mbaye Université Cheikh Anta Diop de Dakar (UCAD)

Fatima Ezzahra Mengoub Policy Center for the New South

Tolulope Olofinbiyi Akademiya2063


Racha Ramadan, Faculty of Economics and Political Science, Cairo University

Simbarashe Sibanda The Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN)

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