

POTENTIALS OF INNOVATION FOR FOOD SECURITY AND SUSTAINABLE AGRICULTURAL GROWTH IN SUB-SAHARAN AFRICA

Strategic Directions for Development Collaboration

Since the majority of Sub-Saharan Africa's population highly depends on agriculture, returns on investments in terms of poverty reduction effects are often highest in this sector. Furthermore, food insecurity is both a driver and a consequence of conflicts and related refugee flows. Improvements in productivity will need to be a major driver of agricultural growth in the region. Agricultural innovations are key to sustainably increase productivity and ensure food security while maintaining environmental quality and resources.

This policy brief proposes a number of measures at a strategic level to inform the "One World, No Hunger" (SEWOH) Initiative by the German government and other investors in their efforts to eradicate hunger and malnutrition and to facilitate sustainable agricultural development.

Now is a good time to invest in African agriculture

Investments in research and development are a key driver of productivity growth. Over the past 15 years, Sub-Saharan African countries have experienced the longest period of economic and agricultural growth since independence which offers good conditions for successful investments. Despite positive growth trends, however, production per head and total factor productivity (TFP, see Box 1 for a definition) still lie below the level of the 1960s in many African countries. Investments in R&D are crucial to ensure an increase in these figures. In addition, labour is the most important asset of poor people. Therefore, improvements in labour productivity are essential drivers of socially sustainable agricultural productivity growth.

Innovations need to cater to the characteristics of the region's agriculture sectors. Agricultural systems across Sub-Saharan Africa vary greatly even within countries. The majority of farmers are still operating on farms with less than two hectares. Innovations for agricultural growth need to consider the challenges and potentials of these diverse and predominantly

small farming operations. They should strengthen the advantages of smallness and transform those factors that favour large farms in a way that also small farms can benefit. Importantly, a 'sustainable intensification' is needed that promotes ecological and socio-economic objectives.

Agriculture and food security have become clear priorities on Africa's political agenda. African agricultural policy has grown more independent of external influences and agricultural development now is an important focus of the African Union. With the Comprehensive African Agriculture Development Programme (CAADP), initiated in 2003, African countries commit to achieving an average agricultural growth of 6% per year, while reducing poverty and improving food security. Many countries are making good progress toward the stated goals. However, despite the strong and growing political support for innovations in agriculture through for instance the Science Agenda for Agriculture in Africa (S3A) or the Science, Technology and Innovation Strategy for Africa 2024 (STISA-2024), investments in R&D have not been increased sufficiently.

Opportunities for collaboration

In order to identify strategic directions for development investment in Africa, a few criteria and principles are proposed here. They are in line with good development practice as specified by development partners (e.g in the Accra Principles) emphasizing partner countries' leadership, and also consider specifics of high expected returns to investment for sustainable agricultural growth and food security.

Results-oriented investment: Expected social outcomes should guide development investments: impacts on hunger reduction, positive income and employment effects on small farms and in rural areas in particular for youth and women, and long term-comparative advantages of production. Also investments should have the potential for upscaling in order to achieve maximum impact.



Build on progress: Development investments need to connect to existing political initiatives in order to maintain policy coherence, notably CAADP. They should also be harmonized with the above-mentioned African initiatives promoting innovations in the agri-food sector.

Target the most promising countries: Countries best suited for development investments can be identified by analyzing the past 10-years performance of Sub-Saharan African countries in terms of:

1. Existing track record of political commitment to foster sustainable agricultural growth
2. Actual progress in sustainable agricultural productivity driven by related innovations
3. Prioritization of actions for hunger and malnutrition reduction

A strong advancement in the CAADP process and improvements in productivity indicate political support and good investment conditions in a country. Cooperation with countries that have not started developing a strategy should be questioned. Investments should be focused on countries where hunger is still a significant problem, but recent successes in the fight against hunger can be seen as indicator for political efforts worthy of support. Based on these criteria, Ethiopia, Mozambique, Sierra Leone, Kenya, Niger, Malawi, Senegal, Congo (Brazz.), Mali and Zambia rank among the 'Top 10' countries for development investment opportunities (see Table 1 for details).

Focus on value chains plus enablers: An approach to work in selected value chains in different countries can help to spur growth and innovation on the regio-

nal level along these value chains. In addition, development initiatives like SEWOH can function as a more general "enabler" for selected countries in the context of African activities in science & technology as outlined in their respective agricultural strategies.

Sound approach to investment: Investments should be guided by principles of good governance, achieving investment at low transaction costs, sound financial practices, and avoidance of diversions of funds. Partnership principles and strict monitoring and evaluation systems must be established which measure the progress with regard to the mutually set goals. A lot can be learned from ongoing initiatives. The Alliance for a Green Revolution in Africa (AGRA), for instance, has established independent evaluation panels that assess potential investments. It would also be desirable to link with the country level review and dialogue processes to foster accountability and facilitate learning and partnerships needed for scaling up.

Capitalize on development partners' strengths: A partnership approach between Africa and development partners like Germany in the field of agriculture and food security should match specific strengths of development partners with African needs concerning innovation-enhancing investments in agriculture, such as vocational training for farmers, optimization of supply chains and cooperation models.

Following these considerations, the development investments can make a significant contribution at large scale in line with Africa's own agenda as a whole, and in accordance with the Sustainable Development Goals of the United Nations.

Box 1: Agricultural total factor productivity in Sub-Saharan Africa

Fuglie und Wang (2012) explain total factor productivity as follows: "Most of the gains in land and labor productivity over the last five decades came from more intensive use of other inputs, such as fertilizers, machinery, and irrigation water. Total factor productivity (TFP) provides a broader concept of agricultural productivity than measures that compare output to just one input, like land or labor. To estimate TFP, researchers total the land, labor, capital, and material inputs used in agriculture and compare growth in total inputs with growth in total output of crop and livestock products. If total output grows faster than total inputs, total factor productivity ("factor" = input) has improved. TFP, therefore, encompasses the average productivity of all inputs employed in the production of all crop and livestock commodities."

Source: Amber Waves Vol 10, No 3

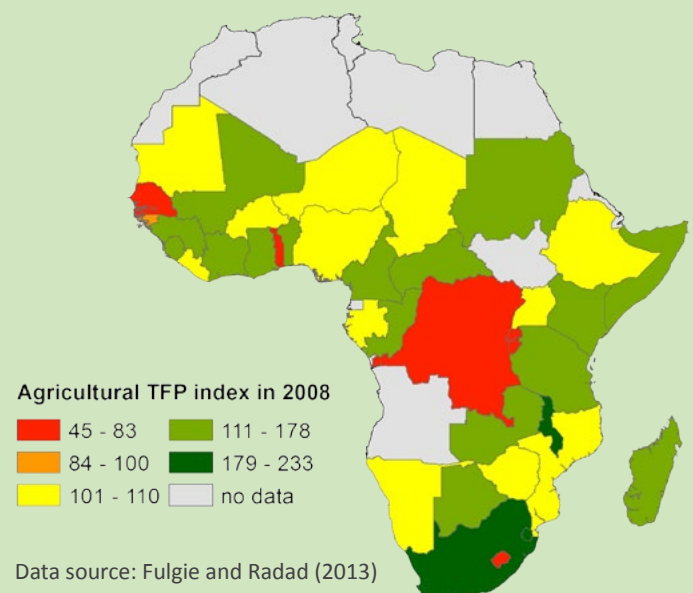




Table 1: Assessment of prospects for development investments in Sub-Saharan Africa

Rank	Country	(1) Production potential score		(2) Political commitment score			(3) Hunger status and progress score		Overall score
		1a) Agricultural growth	1b) Innovation	2a) Public agricultural expenditure	2b) Innovation investment	2c) Progress on agricultural policy	3a) Hunger problem to be addressed	3b) Progress on hunger reduction	
1	Ethiopia	70	60	80	26	100	100	100	78
2	Mozambique	70	60	20	43	88	100	100	72
3	Sierra Leone	80	100	0	22	50	100	100	71
4	Kenya	70	100	0	100	75	60	60	68
5	Niger	60	100	40	0	63	100	60	65
6	Malawi	50	100	90	78	88	30	30	63
7	Senegal	50	30	0	81	88	30	100	54
8	Congo (Brazz.)	50	100	0	97	13	60	30	52
9	Mali	40	60	60	61	63	30	60	52
10	Zambia	20	100	30	38	63	100	0	51
11	Tanzania	50	60	0	51	100	60	30	50
12	Burundi	10	0	0	64	63	100		49
13	Angola	60		0	0	13	60	100	48
14	Benin	20	60	0	53	100	0	100	47
15	Rwanda	60	0	0	61	75	30	100	47
16	Ghana	20	100	0	62	88	0	60	47
17	Burkina Faso	40	0	40	39	88	60	60	45
18	Sudan	10	30	0	25	13	100		(44)
20	Uganda	50	0	0	100	75	60	30	43
22	Zimbabwe	50	0	60	48	13	60	60	42
24	Nigeria	40	60	0	33	63	30	30	37
26	Madagascar	10	30	40	21	13	100	30	37
27	Liberia	50	0	10	47	50	60	30	35
29	Togo	40	0	0	43	75	30	60	35
30	Gambia	30	0	0	82	50	30	60	35
31	Cote d'Ivoire	30	30	0	49	75	60	0	34
32	Cameroon	10	30	0	0	25	30	100	31
35	Chad	40	0	0	14	13	100	0	26
40	Congo DRC	40	0	0	17	63			23

Indicators:

- 1a) Number of years with >6% agricultural growth as % of total years 2005-2014. Data source: www.resakss.org
- 1b) Percentage point change in TFP (2001-2008). Data source: Fuglie & Rada (2011)
- 2a) Number of years with government expenditure on agriculture >10% as % of total years 2005-2014. Data source: www.resakss.org
- 2b) Average share of agricultural GDP spent on R&D (2005 to 2011). Score is 100 if ≥ 1% is spent. Data source: www.asti.cgiar.org/data
- 2c) Number of steps in CAADP process completed (% of the maximum of 8). Data source: www.resakss.org
- 3a) Value of Global Hunger Index (2014). Data source: Amy et al., 2014.
- 3b) Reduction in prevalence of undernourishment (2001-2011). Data source: www.fao.org

Note: For indicators 1b, 3a and 4b, four classes of progress were built based on quartiles of countries (scores: 1st quartile – 0, 2nd quartile – 30, 3rd quartile – 60, 4th quartile – 100). Empty cells indicate missing values, which are excluded from scoring. A more detailed description of the methodology can be found in the full report, including data for Tunisia which is also a PARI partner country, but was not included in this brief because of the focus on Sub-Saharan Africa.



About PARI

The Program of Accompanying Research for Innovation (PARI) brings together partners from Africa, India and Germany to contribute to sustainable agricultural growth and food and nutrition security in Africa and India. PARI offers independent scientific advice to the SEWOH Initiative which, among other activities, supports the improvement of food and nutrition security and sustainable agricultural value chains through Agricultural Innovation Centres (AICs) in 12 African countries and India (as shown on the map).

Specific goals of PARI are to promote and support the scaling of proven innovations in the agri-food sector in collaboration and partnership with all relevant actors; to support and enhance investments in the AICs through research; and thereby to contribute to the development of the agri-food sector in Africa and India through the identification, assessment and up-scaling of innovations.

The core topics and thematic research priorities of the Program have been identified in accordance with the African Union's CAADP as part of the New Partnership for Africa's Development (NEPAD).

PARI's collaborative work includes

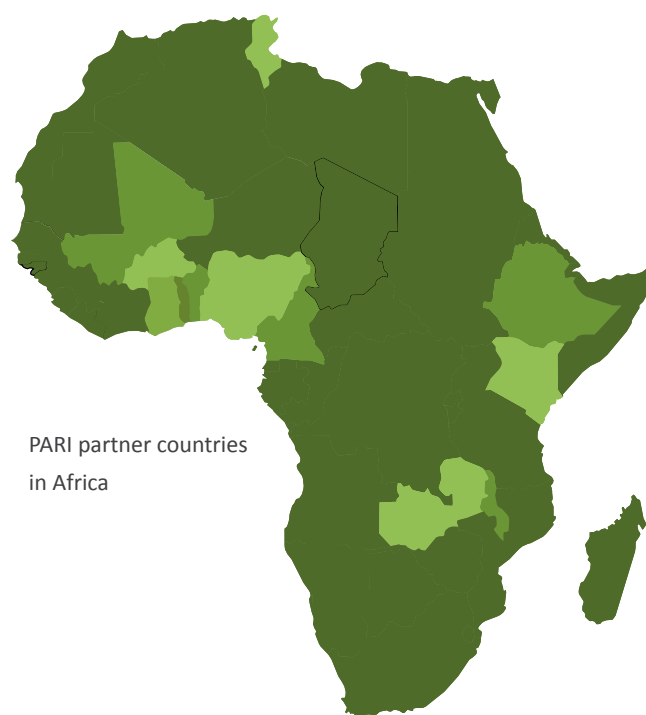
1. Innovation research with future-oriented impact analyses, such as:

- modelling and mapping direct and indirect impacts of potentially promising innovations
- developing methodologies and concepts for strategic analysis of potentials and prospects
- institutional analysis of the AICs in the context of their national agricultural innovation systems

2. Identifying and stimulating technological and institutional innovations, such as:

- screening for promising innovations from research and innovation systems ("top-down" approach)
- soliciting innovations generated by farmers and other actors in the value chains ("bottom-up" approach)
- scaling of innovations

3. Engaging with food and agriculture policy making to enhance approaches for innovation that improve food and nutrition security.



PARI partner countries in Africa

IMPRINT

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Brief prepared by: Heike Baumüller
Cartography: Christine Husmann and Katharina Zinn

PARI implementing partners: ZEF/University of Bonn, University of Hohenheim, Technical University Munich, the Forum for Agricultural Research in Africa (FARA) and its national partners, the African Growth and Development Policy Modeling Consortium (AG-RODEP) facilitated by the International Food Policy Research Institute (IFPRI, Africa Office), and research collaborators in India.

Center for Development Research (ZEF)
Walter-Flex-Str. 3
53113 Bonn | Germany
E-Mail: presse.zef@uni-bonn.de
Phone: +49-(0)228-731846



zef
Center for
Development Research
University of Bonn