

## PARI Interim Report 2021

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in cooperation with PARI Partners



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## Zusammenfassung

Die *Begleitforschung für landwirtschaftliche Innovationen* (PARI) vereint Partner aus Afrika, Indien und Deutschland, um zu nachhaltigem landwirtschaftlichen Wachstum, Transformation von Ernährungssystemen und Ernährungssicherheit beizutragen.

### Arbeitspaket 1: Investitionen in Innovationen zur Verbesserung der Produktivität und Resilienz von Agrar- und Ernährungssystemen

**Nachhaltigkeit / Anpassung an den Klimawandel:** Im Vorfeld der COP-26 der UN-Klimakonvention in Glasgow veröffentlichte PARI eine Reihe von Studien über die **Zusammenhänge zwischen Klimawandel, ländlicher Entwicklung und Ernährungssicherheit in Afrika**, die von Forschern aus Westafrika und der Sahelzone erstellt wurden. In einem Kompendium von Forschungspapieren wurden mögliche Auswirkungen des Klimawandels auf die Ernährungssicherheit in Westafrika untersucht. Die Autoren warnen, dass Westafrika eine der Regionen der Welt ist, die am stärksten durch die Auswirkungen des Klimawandels gefährdet ist. Es gibt jedoch zahlreiche innovative Lösungen für die Anpassung an den Klimawandel und dessen Abschwächung, die derzeit in der Region getestet und eingesetzt werden. Eine Reihe von Länderfallstudien aus der Sahelzone zeigt zudem vielversprechende Lösungen an der Schnittstelle von Land, Wasser, Energie und Klimawandel auf, die eine nachhaltige und integrative ländliche Entwicklung in der Sahelzone ermöglichen könnten.

**Agroforstwirtschaft:** PARI Forschung untersuchte die Rolle der Agroforstwirtschaft bei der Einkommensförderung in ländlichen Gebieten und der nachhaltigen Entwicklung in Afrika. Die Analyse hat ergeben, dass jeder Dollar, der in die Wiederherstellung der Agroforstwirtschaft investiert wird, einen beträchtlichen wirtschaftlichen Ertrag von 3 bis 15 US-Dollar über einen Zeitraum von 30 Jahren bringen könnte. Am ertragreichsten ist die Wiederherstellung von degradierten Agroforstflächen in Ackerbaugebieten. Um die geringe Nutzung von agroforstwirtschaftlichen Praktiken in Afrika zu erhöhen, sind der Aufbau von Kapazitäten, ein besserer Zugang zu Finanzmitteln und die Erforschung agroforstwirtschaftlicher Optionen erforderlich.

**Mechanisierung:** PARI Forschung untersuchte Chancen und Hindernisse für die **lokale Herstellung von Landmaschinen** in Afrika. Die lokalen Hersteller sind hoch motiviert und haben einige komparative Vorteile. Um das Wachstum des Sektors zu fördern, sind Maßnahmen zur Verbesserung des Zugangs zu Kapital, Maschinen, Rohstoffen und Strom sowie einheitliche Normen und Zertifizierungsmechanismen erforderlich. Gezielte Maßnahmen sollten insbesondere Frauen unterstützen, die in diesem Sektor stark unterrepräsentiert sind. Als weiteres Haupthindernis für die Entwicklung, die Herstellung und den Einsatz von Landmaschinen hat sich der **Mangel an fachlichen Kompetenzen** erwiesen. Eine Analyse der Ausbildungseinrichtungen zeigt, dass die Ausbildung im Bereich der landwirtschaftlichen Mechanisierung in Afrika sehr gering und unterfinanziert ist und immer noch überwiegend von der Regierung durchgeführt wird.

**Betriebsmittel (Inputs):** PARI Forschung befasste sich mit Möglichkeiten, den nachhaltigen Einsatz von Betriebsmitteln in Afrika auszuweiten. Eine Studie unterstreicht das Potenzial **dezentraler Saatgutdienste** zur Verbesserung des Zugangs zu Qualitätssaatgut für Kleinerzeuger. In Uganda und Tansania beispielsweise hat sich die Zahl und Zusammenarbeit der Akteure im Saatgutwesen infolge der Dezentralisierungsbemühungen deutlich erhöht. **Ernteversicherungen** könnten zudem eine Rolle dabei spielen, das Risiko von Investitionen in Saatgut und andere Betriebsmittel für Kleinerzeuger zu verringern. Eine Studie kommt zu dem Schluss, dass die Inanspruchnahme unter anderem durch Verbesserungen in der Qualität und Gestaltung von Versicherungsprodukten und die Sensibilisierung der Öffentlichkeit gefördert werden kann sowie einer stärkeren staatlichen Unterstützung für einen stabilen und effizienten Versicherungsmarkt.

**Digitalisierung:** PARI Forschung analysierte den **Stand und die treibenden Kräfte für die Digitalisierung in der afrikanischen Landwirtschaft**. Erhebungen in Kenia, Nigeria, Ghana und Mali zeigen, dass digitale Technologien, insbesondere Mobiltelefone, bei landwirtschaftlichen Akteuren in der Wertschöpfungskette (z.B. landwirtschaftliche Berater und Händler von Inputs und Agrarprodukten) weit verbreitet sind. Die Nutzung digitaler landwirtschaftlicher (D4Ag) Dienste ist jedoch sehr begrenzt. Eine Umfrage unter potenziellen Nutzern digitaler Plattformen zur Bündelung von D4Ag-Diensten in Kenia ergab, dass solche Plattformen die Akzeptanz dieser Dienste fördern könnten, wenn sie die D4Ag-Dienste leichter auffindbar und nutzbar machten, Qualität und Zuverlässigkeit garantierten, den Zugang für diejenigen ermöglichten, die über geringere digitale Fähigkeiten verfügen, und ein breites Spektrum von Akteuren und Aktivitäten entlang der Wertschöpfungskette abdeckten.

**Aquakultur:** PARI Forschung bewertete die Entwicklung der Aquakultursektoren der afrikanischen Länder anhand einer Reihe von Indikatoren auf nationaler Ebene. Um die nachhaltige Ausweitung der Aquakulturproduktion zu unterstützen, müssen die politischen Rahmenbedingungen verbessert, Frauen in der Aquakulturproduktion gestärkt und Maßnahmen zur Verringerung der Umweltauswirkungen sowie zur Anpassung an den Klimawandel ergriffen werden. Besonderes Augenmerk sollte auf die Einbindung und den Aufbau der Kapazitäten kleiner Akteure in diesem Sektor gelegt werden, damit sie zur lokalen Ernährungssicherheit, zur Beschäftigung und zur Schaffung von Einkommen beitragen können.

**Sozioökonomische Aspekte der Tierhaltung:** PARI Forschung untersuchte das Potenzial von Innovationen zur Förderung der nachhaltigen Viehwirtschaft in Afrika. Eine Analyse **digitaler Dienste für die Viehzucht** in Indien und Kenia legt nahe, dass digitale Technologien viele neue Möglichkeiten bieten, um Hindernisse bei der Entwicklung der Viehzucht zu beseitigen. Eine andere Studie zeigt, dass **vernachlässigte Nutztierarten** aufgrund ihrer ernährungsphysiologischen Bedeutung, ihrer hohen wirtschaftlichen Bruttoerträge, ihrer ökologischen Nachhaltigkeit und ihrer Bedeutung für die Stärkung von Frauen wichtige Chancen bieten. Allerdings müssen noch Herausforderungen bei der Produktion, z. B. in Bezug auf Futtermittel und Ernährung, und institutionelle Lücken angegangen werden.

## **Arbeitspaket 2: Beschäftigungs- und Einkommensmöglichkeiten in ländlichen Gebieten, insbesondere für Jugendliche und Frauen**

**Einkommen und Beschäftigung:** Eine Studie in Indien untersuchte die **Auswirkungen der Covid-19-Pandemie auf Wanderarbeiter**. Nach der Rückkehr in ihre Heimatdörfer sank das Haushaltseinkommen der Migranten zwischen Juni und August 2020 um 85 Prozent. Mit der Wiederbelebung der wirtschaftlichen Aktivitäten nach dem Lockdown kehrten 64 Prozent der Migranten bis Februar 2021 in die Zielgebiete zurück, wo sie 8 Prozent weniger verdienten als vor dem Lockdown. Bei den Migranten, die in ihren Dörfern blieben, lag das Haushaltseinkommen um 82 Prozent niedriger als vor dem Lockdown. Die meisten der staatlichen Unterstützungsmaßnahmen erreichten die Wanderarbeiter kaum.

**Einbindung der Jugend:** Die Forschung untersuchte die Faktoren, die die **Beteiligung junger Menschen in der landwirtschaftlichen Produktion und anderen Aktivitäten in der Agrarwirtschaft** beeinflussen. Eine Umfrage unter jungen Agrarunternehmern in Benin, Äthiopien, Senegal und Tunesien ergab, dass sich Jugendliche eher im Agrarsektor engagieren würden, wenn sie besseren Zugang zu Rohstoffen, Land, Kapital und Maschinen, bessere Ausbildungsmöglichkeiten und bessere Verbindungen zu Kunden hätten. Untersuchungen in Sambia und Kenia zeigen auch, dass die Dichotomie zwischen "landwirtschaftlichen" und "außerlandwirtschaftlichen" Entwicklungspfaden aus der Sicht der Jugendlichen wenig Sinn macht, da sie es vorziehen, gemischte Strategien für ihren Lebensunterhalt zu verfolgen. Zudem können sich männliche Jugendliche eher eine landwirtschaftliche Tätigkeit vorstellen als weibliche Jugendliche. Dies spiegelt die Erwartungen ihrer Eltern wider und wird durch das patriarchalische System der Landvererbung noch verstärkt.

**Kapazitätsaufbau und Bildung:** Durch die Partnerschaft mit dem African Economic Research Consortium (AERC) zielt PARI darauf ab, die Kapazitäten für wirtschaftspolitische Forschung und die Ausbildung von Hochschulabsolventen in Afrika südlich der Sahara zu verbessern. Insgesamt werden 15 Masterstudenten und 5 Doktoranden gefördert. Die Forschungsergebnisse wurden 2021 in einer Reihe von virtuellen Seminaren vorgestellt und diskutiert.

**Arbeitspaket 3: Beteiligung an der Gestaltung der Ernährungs- und Agrarpolitik, um Ansätze für Innovationen zu fördern, die die Ernährungssicherheit und Lebensmittelsicherheit verbessern**

Um die **Faktoren** besser zu verstehen, **die das landwirtschaftliche Wachstum und die Ernährungssicherheit beeinflussen**, hat die PARI-Forschung die landwirtschaftlichen Wachstumspfade indischer Staaten und afrikanischer Länder verglichen. Die Untersuchung zeigt, dass die Triebkräfte des landwirtschaftlichen Wachstums in den beiden Regionen unterschiedlich sind: In Indien war die Intensivierung der Landwirtschaft die wichtigste Triebkraft, während viele afrikanische Länder auf die Ausweitung der landwirtschaftlichen Nutzfläche zur Steigerung der Produktion setzten. Produktivitätsgewinne und Fortschritte bei der strukturellen Transformation erwiesen sich als wesentliche Faktoren, um nachhaltige Auswirkungen auf die Nahrungsmittel- und Ernährungssicherheit zu erzielen, weniger die reine Intensivierung. Darüber hinaus werden positiven Effekte im Bereich Ernährung durch Synergien mit verwandten Sektoren wie Wasserversorgung und sanitäre Einrichtungen sowie der Bildung von Frauen begünstigt.

Um die PARI-Ergebnisse zu verbreiten und in politische Prozesse einzubringen, organisierten die Partner des PARI-Konsortiums im Jahr 2021 mehrere (hauptsächlich virtuelle) Veranstaltungen. Unterstützt wurden die Outreach-Aktivitäten durch soziale Medien und Publikationen, darunter Policy Briefs, Studien und Meinungsbeiträge. Online-Statistiken zeigen, dass PARI ein breites Publikum afrikanischer politischer Akteure erreicht und einbindet.

## Executive Summary

The Program of Accompanying Research for Agricultural Innovation (PARI) brings together partners from Africa, India and Germany to contribute to sustainable agricultural growth, food systems transformation and food and nutrition security in Africa and India. Highlights in 2021 include:

### Work Package 1: Innovation investments to improve the productivity and resilience of agricultural and food systems

**Sustainability / climate change adaptation:** Ahead of COP-26 of the UN Climate Change Convention in Glasgow, PARI released a number of studies on the **interlinkages between climate change, rural development and food security in Africa**, prepared by researchers from West Africa and the Sahel region. A compendium of papers explored possible impacts of climate change on food security in West Africa. The authors warn that West Africa is one of the regions in the world that are most vulnerable to climate change impacts. However, there are numerous innovative solutions for climate change adaptation and mitigation currently being tested and deployed in the region. A series of country case studies from the Sahel region also highlights promising solutions at the nexus of land, water, energy and climate change that could enable sustainable and inclusive rural development in the Sahel.

**Agroforestry:** Research evaluated the role of agroforestry in promoting rural livelihoods and sustainable development in Africa. Restoring degraded agroforestry areas could provide significant economic returns of US\$ 3-15 for each dollar invested into agroforestry re-establishment over a period of 30 years. The highest return activities are the restoration of degraded agroforestry in croplands. To increase low adoption rates of agroforestry practices in African, capacity building, better access to finance, and research into agroforestry options is required.

**Mechanization:** Research assessed opportunities and constraints of **local manufacturing of agricultural machinery** in Africa. Local manufacturers are highly motivated and have some comparative advantages. To support the growth of the sector, measures to improve access to capital, machinery, raw materials and electricity, as well as common standards and certification mechanisms are needed. Targeted measures are also required to support women who are seriously under-represented in this sector. **Skill gaps** emerged as another key obstacle to the development, manufacture and use of agricultural machinery. A review of training institutes shows that agricultural mechanization-related training in Africa is negligible, underfunded and still provided predominantly by government.

**Inputs:** Research explored options for scaling input use in Africa. One study highlights the potential of **decentralized seed services** to improve access to quality seed for smallholder farmers. Uganda and Tanzania, for instance, have seen the numbers and interactions of players in the seed systems increase substantially as a result of decentralization efforts. **Crop insurance** could play a role in de-risking farmers' investments in seeds and other inputs. A study concludes that uptake can be encouraged, *inter alia*, by improving the quality and design of insurance products, raising awareness and increasing government support for a stable and efficient insurance market.

**Digitalization:** Research investigated the **state and drivers of digitalization in African agriculture**. Surveys in Kenya, Nigeria, Ghana and Mali show that digital technologies and in particular mobile phones are widely used among agricultural intermediaries, including input and output dealers and extension agents. Adoption of digital agricultural (D4Ag) services remains very limited, however. A survey of potential users of digital platforms to aggregate D4Ag services in Kenya finds that such platforms could facilitate uptake if they made D4Ag services easier to locate and use, guaranteed quality and reliability, enabled access for those who are less digitally skilled, and covered a broad range of actors and activities along the value chain.

**Aquaculture:** Research assessed the development of African countries' aquaculture sectors across a range of national-level indicators. Supporting the sustainable expansion of aquaculture production will require strengthening policy frameworks, empowering women in aquaculture production and taking measures to reduce environmental impacts and mitigate and adapt to climate change. Particular attention should be paid to engaging and building the capacities of small-scale actors in this sector to contribute to food security, employment and income generation.

**Socio-economic aspects of animal husbandry:** Research explored the potential of innovations to promote livestock sector development in Africa. A review of **digital livestock tools** in India and Kenya suggests that digital tools provide many new options to address constraints to livestock development. Another study shows that **neglected livestock species** offer important opportunities in terms of their nutritional importance, high economic gross returns, environmental sustainability, and importance for women's empowerment. Production challenges, related e.g. to feed and nutrition, and institutional gaps remain to be addressed, however.

## **Work Package 2: Employment and income opportunities in rural areas, especially for youth and women**

**Income and employment:** Research in India assessed the **impact of the Covid-19 pandemic on migrant workers**. After returning to their home villages, migrants' household income fell by 85 percent during June-August 2020. With the revival of economic activities post-lockdown, 64 percent of migrants had returned to the destination areas by February 2021, where they earned 8 percent less compared to pre-lockdown levels. Among the migrants who remained in their villages, household income was 82 percent lower than prior to the lockdown. Most of the government support measures barely reached migrant workers.

**Youth engagement:** Research assessed the factors that influence **youth participation in farming and other agribusiness**. A survey of young agripreneurs in Benin, Ethiopia, Senegal and Tunisia finds that better access to raw materials, land, capital, machines and training as well as better linkages with customers would encourage youth to engage in agribusiness. Research in Zambia and Kenya also shows that the dichotomy between "farm-based" and "off-farm based" development pathways makes little sense from the perspective of the youth who prefer to pursue mixed livelihood strategies. Moreover, male youth are more likely to envision farming than female youth. This reflects their parents' aspirations and is reinforced by the patriarchal system of land inheritance.

**Capacity building and education:** Through its partnership with the African Economic Research Consortium (AERC), PARI aims at enhancing the capacities for economic policy research and graduate training in sub-Saharan Africa. Overall, 15 master students and 5 PhD students are being funded. The research outputs were presented and discussed at a series of virtual seminars in 2021.

## **Work Package 3: Engaging with food and agriculture policy making to enhance food and nutrition security**

To better understand the factors that drive agricultural growth and nutrition outcomes, PARI research compared the **agricultural change trajectories of Indian states and African countries**. The research shows that the drivers of agricultural growth differed between the regions: Agricultural intensification was the main driver of India while many African countries made use of agricultural area expansion to increase output. Gains in productivity and progress in structural transformation, rather than pure intensification, proved essential to achieve sustained impacts on food and nutrition security. In addition, nutrition outcomes are driven by synergies with related sectors, such as water and sanitation as well as women's education.

To disseminate PARI findings and input into policy processes, partners in the PARI consortium organized and participated in several (mainly virtual) events in 2021. Outreach activities were supported by social media and publications, including policy briefs, studies and opinion pieces. Online statistics show that PARI is reaching and engaging a wide audience of African policy stakeholders.



## 1. Project overview

### Objective of the Program of Accompanying Research for Innovation – PARI

PARI brings together partners from Africa, India and Germany **to contribute to sustainable agricultural growth, food systems transformation and food and nutrition security in Africa and India**. PARI offers independent scientific advice to the German government's activities to combat hunger and malnutrition. Among other activities, German government seeks to achieve its objectives through its network of 14 Green Innovation Centers (GICs) in Africa as well as India. The research-based information generated in PARI serves to strengthen the integration of the GICs into national, regional and continental institutional partner settings, in order to enhance value chains contributing to rural and agricultural development. Specifically, the PARI pursues the following strategies:

1. Analysis of the **potential and impact of innovations – policy, institutional and technical innovations** (which innovations to invest in, where and for whom – considering women, youth, small-scale producers),
2. Identification and assessment of **supportive measures to strengthen framework- and policy conditions** for the generation and dissemination of promising innovations in food systems and rural areas, and
3. Engaging food, nutrition, agriculture and rural areas' **science partners and policy makers** to inform reforms and investment decisions that can improve job creation and food and nutrition security.

### Core partners

Partner organizations	Focal point
<ul style="list-style-type: none"><li>• <b>ZEF</b> Center for Development Research University of Bonn</li></ul>	Prof. Dr. Joachim von Braun, Project Director Dr. Heike Baumüller, Project Coordinator
<ul style="list-style-type: none"><li>• <b>FARA</b> Forum for Agricultural Research in Africa</li></ul>	Dr. Yemi Akinbamijo, Executive Director Dr. Wole Fatunbi, Project Coordinator
<ul style="list-style-type: none"><li>• <b>AGRODEP</b> African Growth and Development Policy Modeling Consortium (AGRODEP) hosted by AKADEMIYA2063</li></ul>	Dr. Ousmane Badiane, Executive Chairperson, Akademiya2063 Dr. Getaw Tadesse, Project Coordinator
<ul style="list-style-type: none"><li>• <b>UHO</b> University of Hohenheim</li></ul>	Prof. Dr. Regina Birner, Head of Social and Institutional Change in Agricultural Development Dr. Thomas Daum, Project Coordinator



**Country partners in India and Africa include:**

- Agricultural Research Council of Nigeria (ARCN), Nigeria
- Council for Scientific and Industrial Research (CSIR), Ghana
- Department of Agricultural Research Services (DARS), Malawi
- Indian Council for Research on International Economic Relations (ICRIER)
- Institut de Recherche Agricole pour le Developement (IRAD), Cameroon
- Institut d'Economie Rurale (IER), Mali
- Institut de L'Environnement et de Recherches Agricoles (INERA), Burkina Faso
- Institut National de Recherche Agronomique de Tunis (INRAT)
- Institut Sénégalais de Recherches Agricoles (ISRA), Senegal
- Institut Togolaise de Recherche Agronomique (ITRA), Togo
- Kenya Agricultural and Livestock Research Organization (KALRO)
- Lilongwe University of Agriculture & Natural Resources (LUANAR)
- Makerere University, Uganda
- National Agricultural Research Institute of Benin (INRAB)
- National Agricultural Research Organisation (NARO), Uganda
- Policy Studies Institute (PSI, formerly Ethiopian Development Research Institute EDRI), Ethiopia
- Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI)
- University of Ghana – Institute of Statistical, Social and Economic Research (ISSER)
- University of Nairobi, School of Computing and Informatics
- Université Cheikh Anta Diop de Dakar, Senegal (UCAD)
- Zambia Agriculture Research Institute (ZARI)

**Regional partners include:**

- African Economic Research Consortium (AERC), based in Kenya
- AGRHYMET, Permanent Inter-State Committee for Drought Control in the Sahel (CILSS), Niger
- International Livestock Research Institute – Africa offices
- SADC Research Center, South Africa
- World Aquaculture Society – Africa Chapter, based in South Africa

## 2. Activities and achievements in 2021

### WP 1: Innovation investments to improve the productivity and resilience of agricultural and food systems

In this work package, PARI research seeks to develop and apply approaches to identify the most cost-effective technological and institutional innovations for specific locations, target audiences, commodities and value chain stages across Africa that have the highest impact with regard to the PARI goals.

#### a) Agricultural mechanization

Research sought to identify opportunities to promote **local manufacturing of agricultural machinery**, including mapping the status of local production, challenges that have to be addressed to make manufacturing thrive and the type of actions needed by stakeholders and policymakers. Based on survey data collected from almost 400 local manufacturers in Benin, Kenya, Mali and Nigeria, the researchers find that local manufacturers are highly motivated and have some comparative advantages. If harnessed, the sector can contribute to sustained economic growth, job creation and poverty reduction. To support the growth of the sector, a number of measures would be needed, e.g. improved access to capital, machinery, raw materials and electricity; common standards and certification mechanisms; investments in knowledge and skills development; and a conducive business environment. Targeted measures are also needed to support women to engage in this sector, given that the vast majority of local manufacturers in the survey countries are male. The country studies and a comparative cross-country study are expected to be published in 2022.

How could local African manufacturers of farm machinery be supported to expand their business operations?

**Skill gaps** emerged as one of the key obstacles not only to the development and manufacture, but also the use of agricultural machinery. Too few agricultural education and training institutions exist in Africa. Agricultural mechanization related training is negligible, underfunded and still provided predominantly by government (public sector), especially in Kenya and Mali. The type of mechanization training offered also differs between countries. In Benin, for instance, training is focused predominantly on manufacturing of agro-processing equipment, while in Kenya the training is centered on utilization of agricultural equipment (especially tractors). Gender imbalances can also be observed; the proportion of male to female students is quite high in all the countries across the different types of institutions.

What is the status of training related to agricultural mechanization in Africa?

#### b) Inputs (seed, fertilizer) and finance for smallholders and rural small businesses

Less than 5 percent of small-scale farmers in Africa are participating in **crop insurance** schemes, despite their high vulnerability to shocks, such as climate hazards. A review of recent evidence on the factors that influence the take-up of agricultural insurance among African farmers highlights a number of obstacles that could be addressed to increase uptake, including poor quality and design of insurance products; low household incomes and therefore inability to purchase insurance; low awareness and knowledge of insurance products; personal and cultural preferences; and insufficient government support to enable the emergence of a stable and efficient insurance market.<sup>1</sup>

What prevents African farmers from taking up crop insurance?

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<sup>1</sup> Nshakira-Rukundo et al. (2021) [Determinants of uptake and strategies to improve agricultural insurance in Africa: a review](#).

**Decentralized seed services** have the potential to increase the availability and accessibility of quality seed to smallholder farmers. PARI research assessed opportunities and challenges with such services in the context of Tanzania and Uganda.<sup>2</sup> Both countries have seen the numbers of players in the seed systems increase as a result of decentralization efforts, supported by related policies. In Uganda, a coordinating agency is advancing the production of quality declared seed (QDS) in the country. In Tanzania, such an agency does not exist and many activities are less coordinated. Despite notable improvements, various challenges remain. Several services have still not been fully decentralized, notably the management of plant genetic resources (Tanzania) and seed testing (both countries). Some of the systems' key players, such as community seed banks and QDS farmers, are not yet financially sustainable, in part due to the short time of operations. An evaluation of their performance over the next few years would provide useful insights into their performance and the viability of various decentralized services.

How could decentralized seed services enhance access to quality seed for smallholder farmers?

Herbicides use is on the rise across the developing world. Herbicides may come with several advantages, for example, they may help to improve yields, thereby contributing to food and nutrition security. PARI research investigated an under-studied spillover effect of this trend – the **impact of growing herbicide use on the consumption of edible weeds**.<sup>3</sup> Field research in Zambia shows that edible weeds are an integral part of rural diets, in particular during the “hunger months”. All surveyed households consumed edible weeds collected primarily from their agricultural fields, ranging from 3.5 (arithmetic mean) to 10 different weeds. Due to low levels of herbicide use, the consumption of edible weeds has not (yet) been significantly affected. Long-term herbicide users are, however, less likely to consume edible weeds. Given the potential trade-offs between herbicides, edible weeds and food security, this topic should continue to be monitored.

How will growing herbicide use affect the consumption of edible weeds in Africa?

### c) Digitalization in food and agriculture

Surveys of agro-output and agro-input dealers as well as extension agents in Kenya, Nigeria, Ghana and Mali sought to assess the **use and impact of information and communication technologies (ICTs) among agricultural intermediaries**. The country studies show that ICTs are widely used among intermediaries. Smartphone use is particularly widespread among extension agents, followed by input and then output dealers. Extension agents mainly use ICTs to offer information and training to producers while input and output dealers mainly use them to facilitate market transactions. In terms of impacts, the intermediaries highlighted in particular easier, faster and cheaper communication, better access to information, broader networks for purchases and sales, and faster payments. In contrast, adoption of digital agricultural (D4Ag) services among intermediaries remains low, suggesting that the digital transformation of African agriculture is being driven by the technologies themselves, rather than dedicated digital services provided via ICTs. The country studies and a cross-country comparative study are expected to be published in 2022.

How do agricultural intermediaries make use of ICTs in their professional activities?

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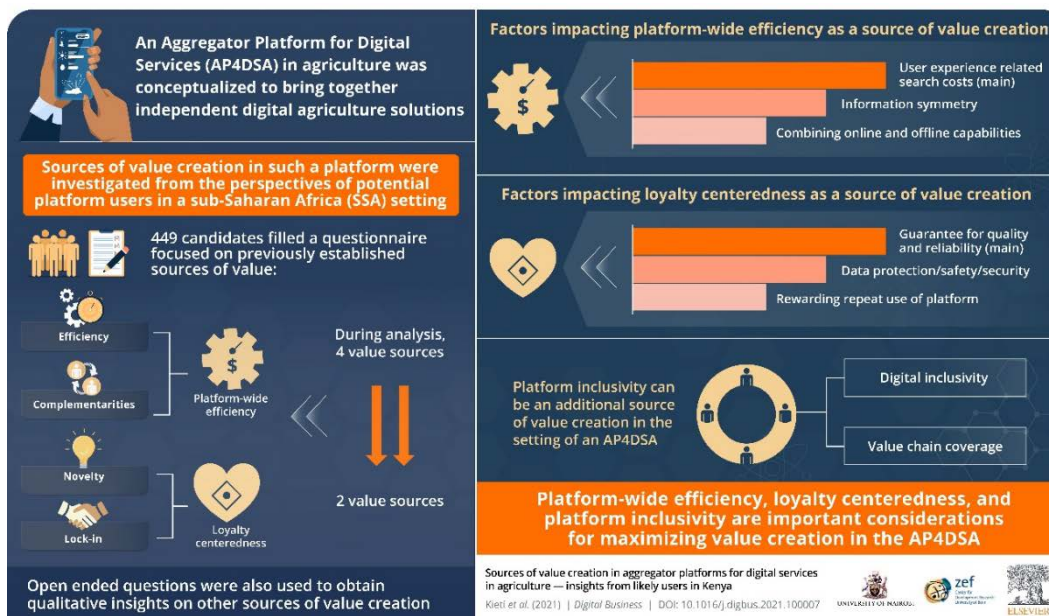
<sup>2</sup> Waithaka et al. (2021) [Decentralized Seed Services in Africa: An Assessment of Tanzania and Uganda](#).

<sup>3</sup> Daum et al. (2021) [Edible weeds and food and nutrition security in the face of the herbicide revolution](#).

To facilitate uptake of D4Ag services, research assessed the technological and economic feasibility of **aggregating D4Ag services in a single platform** from the perspectives of potential users in Kenya. Respondents highlighted a number of key characteristics of such platforms that would encourage them to join, i.e. if they make D4Ag services easier to locate and use, guarantee quality and reliability of the services, enable access for those who are less digitally skilled, and cover a broad range of actors and activities along the value chain (Figure 1).<sup>4</sup> The research also assessed the main factors that prevent D4Ag services from scaling. The main constraints highlighted by users were lack of digital skills, poor technology infrastructure, difficulties to find and use D4Ag services, affordability and the public policy environment.<sup>5</sup>

What can drive the scaling of digital agricultural services and platforms in Africa?

Figure 1: Sources of value creation in digital platforms for agriculture<sup>4</sup>



Source: Elsevier

#### d) Socio-economic aspects of animal husbandry

Research in this area explored the potential of **digital technologies to promote livestock sector development** in Africa. A review of digital livestock tools in India and Kenya suggests that digital tools provide many new options to address constraints to livestock development. So far, most tools are still simple, but the use of smart tools is increasing. Most digital tools focus on dairy production, suggesting neglect of other types of livestock, and there are few tools for pastoralists. PARI researchers developed and tested an ICT application that could help to reduce milk yield gaps. The application reduced yield-gaps by 2-6 percent.<sup>6</sup> Achieving a higher impact would require a higher quality of input data and models used in ICT applications as well as addressing structural constraints beyond the reach of digital tools.

How could digital tools promote livestock sector development in Africa?

<sup>4</sup> Kieti et al. (2021) [Sources of value creation in aggregator platforms for digital services in agriculture — insights from likely users in Kenya](#)

<sup>5</sup> Kieti et al. (2022) [What really impedes the scaling out of digital services for agriculture? A Kenyan users' perspective](#).

<sup>6</sup> Bateki et al. (2021) [Of milk and mobiles: Assessing the potential of cellphone applications to reduce cattle milk yield gaps in Africa using a case study](#).

PARI research also assessed the potential of **neglected livestock species**, such as grasscutter, guinea fowl, guinea pig, rabbit and donkey, for African producers.<sup>7</sup> In the past, efforts to promote livestock sector development have been geared towards intensifying the production of conventional livestock species, namely cattle, sheep, and goats, as well as pigs and poultry. The study shows that neglected livestock species offer important opportunities in terms of their nutritional importance (high quality protein, low fat, high dressing percentage), high economic gross returns, environmental sustainability, and importance for women's empowerment. However, considerable barriers to scaling persist, including production challenges such as feed and nutrition as well as diseases and pests; and institutional problems, such as exclusion from policies and development strategies, lack of research and extension, unavailability of credit facilities, inadequate markets, and animal welfare issues.

Can neglected livestock species offer new opportunities for African producers?

### e) Sustainability / climate change adaptation

Ahead of COP-26 of the UN Climate Change Convention in Glasgow, PARI published a compendium of research papers prepared by West African scientists on the **interlinkages between climate change and food security in West Africa**.<sup>8</sup> The research papers, prepared by both experienced researchers and many highly promising early career climate change scientists from the region, focus not only on climate change impacts, but even more also on innovative and cutting-edge solutions and insights for climate change adaptation and mitigation. The authors warn that West Africa is one of the regions in the world that are most vulnerable to climate change impacts. However, there are numerous innovative solutions for climate change adaptation and mitigation currently being tested and deployed in the region. Crucially, the region now possesses a strong cadre of young climate change researchers who can contribute to the climate resilient development in West Africa. The report calls on the international community to expand and strengthen scientific collaborations and development cooperation on climate change with the region.

What innovative solutions can help West African countries to adapt to and mitigate climate change impacts on food security?

PARI published a series of national cases studies (Burkina Faso, Ethiopia, Mali, Niger, Nigeria, Senegal, Sudan) and a regional synthesis report on **rural development, agricultural livelihoods and job creation in the Sahel Region**.<sup>9</sup> The studies identify promising technological, socio-economic and policy solutions at the nexus of land, water, energy and climate change that could enable environmentally sustainable and socially inclusive rural development in the Sahel. Key lessons learnt from ongoing national policy initiatives for sustainable development highlight the importance of active stakeholder consultation and participation in policy formulation, institutions for effective policy monitoring and assessment, and avoiding of excessive reliance on external sources of funding for the successful implementation of sustainable development policies and programs.

What solutions at the nexus of land, water, energy and climate change can promote sustainable and inclusive rural development in the Sahel region?

<sup>7</sup> Oguiche et al. (2021) [Is there Unrecognized Potential in Neglected Livestock Species?](#)

<sup>8</sup> Mbaye, von Braun, Mirzabaev, Gueye (eds.) (2021) [Climate Change and Food Security in West Africa](#)

<sup>9</sup> Mirzabaev et al. (2021) [Land, Climate, Energy, Agriculture and Development in the Sahel](#) and related country studies

## f) Aquaculture

African aquaculture production has gradually increased over the years, but progress is still slow even though the continent holds some of the greatest unexploited potential for aquaculture growth. To provide fresh insights into the structure and performance of African countries' aquaculture sectors, PARI research assessed the development of the sectors across a range of national-level indicators.<sup>10</sup> Egypt takes the lead on many of these indicators, including contribution of aquaculture to national fish supply, absolute production volumes and value, contribution to GDP and output relative to available renewable water resources. Looking at growth rates, other countries stand out, such as Rwanda, Burundi, Lesotho and Benin (albeit from a low base), while Lesotho, South Africa and Mauritius lead in the value of production per tonne due to the cultivation of a number of high-value species for export. The greatest gap between per capita fish supply and average African fish supply was recorded for Ethiopia (followed by Guinea-Bissau and Sudan), highlighting future growth potential.

Supporting the sustainable expansion of the African aquaculture sectors will require strengthening policy frameworks, empowering women in aquaculture production and taking measures to reduce environmental impacts and mitigate and adapt to climate change. Particular attention should be paid to engaging and building the capacities of small-scale actors in this sector to contribute to local food security, employment and income generation.

## g) Agroforestry

PARI research evaluated the role that agroforestry can play in promoting rural livelihoods and sustainable development in Africa. Applying an ecosystems services approach to the economic valuation of agroforestry finds about 20 billion US dollars of estimated losses between 2001 and 2018 through reductions in agroforestry areas in pastoral systems and 1.7 billion US dollars in cropping systems. Gains from the expansion of agroforestry in pastoral systems were about 21.6 billion US dollars and 3.7 billion US dollars in cropping systems. Restoring degraded agroforestry areas in pastoral and cropping systems provides significant economic returns; depending on the location and agroforestry systems being restored each dollar invested into agroforestry re-establishment can yield 3-15 US dollars of return over a period of 30 years. The highest return activities are the restoration of degraded agroforestry in croplands.

Despite such high returns from agroforestry investments, their adoption remains relatively slow in many African countries. This is because agroforestry innovations are relatively complex, requiring the management of at least two species and their interactions. In most cases, it takes several years before agroforestry options start generating tangible profits. To provide enabling environments for the development of agroforestry systems, national policies need to revise land use regulations as well as institutional frameworks through an agroforestry lens. A comprehensive but locally diverse approach by African organizations and development partners for capacity building and strengthening, expanding access to finance, as well as supporting research for developing and refining agroforestry options has substantial ecological and developmental potentials. The study is expected to be published in 2022.

Which are the leading countries in aquaculture sector development in Africa?

What would be the economic returns of agroforestry expansion in Africa?

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<sup>10</sup> Hinrichsen et al. (2022) [Prospects for Aquaculture Development in Africa: A review of past performance to assess future potential](#).



## WP 2: Employment and income opportunities in rural areas, especially for youth and women

In this work package, PARI research is examining options for generating jobs and other income opportunities in the rural economy in general and specifically for the rural youth and women. The focus is on employment along agricultural value chains (e.g. logistics, processing, retail) as well as supporting businesses (e.g. financial services, machinery operators, mechanics).

### a) Employment opportunities

Research in India assessed the **impact of the Covid-19 pandemic on migrant workers**. The study concludes that the unprecedented migrant crisis is one of the major catastrophes that emerged during the pandemic.<sup>11</sup> Without employment opportunities in their home villages, migrants' household income fell by 85 percent during June-August 2020. With the revival of economic activities post-lockdown, 64 percent of migrants had returned to the destination areas by February 2021, while 36 percent were still in their home villages. Among the migrants who remained in their villages, household income was 82 percent lower than prior to the lockdown. Even migrants who had returned to their places of work earned 8 percent less compared to pre-lockdown levels. To support vulnerable populations, the central government put in place a series of packages, but most of these barely reached migrant workers. Existing social safety measures urgently need to be revised to mitigate negative effects of similar economy-wide shocks in the future.

How did the Covid-19 pandemic impact the income of migrant workers in India?

A cross-country study explored the **linkages between firm level innovation, productivity growth and employment** in nine Sub-Saharan African countries. The study finds a low level of innovation among African firms. While small and medium sized enterprises tend to innovate less than larger firms, proportionally they innovate more than they invest in R&D. Regarding success factors for innovation, the study shows that success in entrepreneurship not only depends on firm characteristics, but also on the nature of the industry. Thus, where an industry is still at the initiation stage, product innovation could be sufficient to be successful. However, if an industry has already reached maturity stage, success depends on the ability of the entrepreneur to innovate new methods of doing business. The study is expected to be published in 2022.

What are the patterns and drivers of firm-level innovations in Africa?

### b) Youth engagement

Surveys of young agripreneurs in Benin, Ethiopia, Senegal and Tunisia sought to understand how more **African youth could be engaged in agribusiness**. The respondents highlighted limited access to loans as the main constraint across almost all countries (with the exception of Tunisia where lack of market information featured most often) (Figure 2). They also stressed the need for skill development, including formal education and practical skills related to agribusiness (i.e. technical, managerial and soft skills). In terms of practical measures to help with business operations, young agripreneurs also called for better access to raw materials, land and machines, linkages with customers and more stable prices. The country studies will be published in 2022.

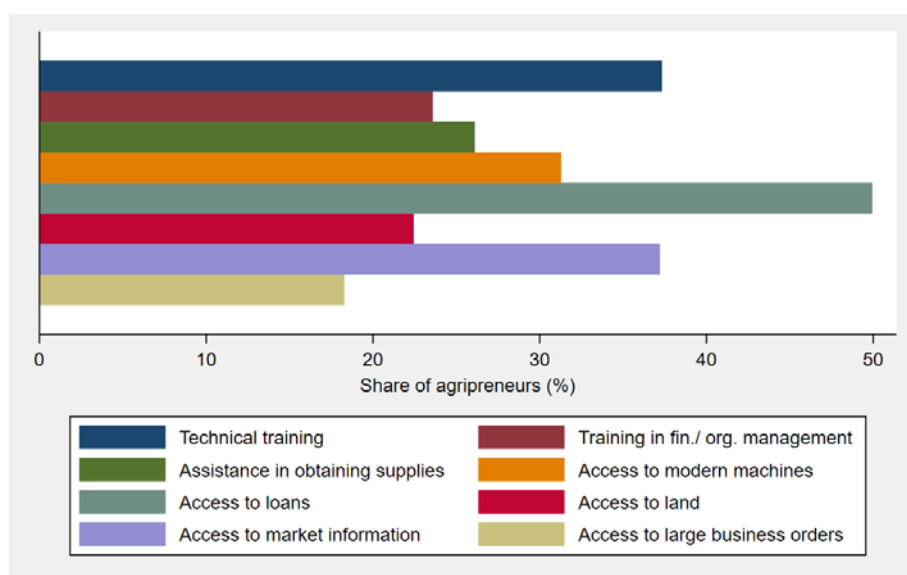
How can African youth be encouraged to engage in agribusiness?

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<sup>11</sup> Gulati et al. (2021) [COVID-19: Emergence, spread and its impact on the Indian economy and migrant workers](#).



Figure 2: Support called for by young agripreneurs in Benin, Ethiopia, Senegal and Tunisia



Source: survey data from national PARI partners (N=795)

Two studies explored the **aspiration of African youth to engage in farming activities** in Zambia and Kenya. The research suggests that the dichotomy between “farm-based” and “off-farm based” development pathways makes little sense from the perspective of the youth, given that few young people want to be full-time farmers. Instead, agricultural policies and programs for young people should take into account that youth prefer to pursue mixed livelihood strategies.<sup>12</sup> Looking at the actors that influence aspirations, the second study shows that parents strongly shape youth aspirations – much more so than siblings, peers, church, and media.<sup>13</sup> Male youth are more likely to envision farming (full or part-time) than female youth. This reflects their parents’ aspirations and is reinforced by the patriarchal system of land inheritance. Parents’ farm characteristics such as degree of mechanization are also associated with aspirations.

What shapes the aspirations of African youth to work in farming?

### c) Capacity building and education

As part of PARI’s collaboration with the African Economic Research Consortium (AERC), PARI aims to contribute to AERC’s effort to **enhance the capacities for economic policy research and graduate training in sub-Saharan Africa**. Within this, financial and academic support is being provided to postgraduate students and post-doctoral researchers to undertake research within the thematic areas of PARI. Overall, 15 Masters students (from Ethiopia, Kenya, Liberia, Malawi, Tanzania, Togo, Uganda and Zimbabwe) and 5 PhD students (from Kenya, Nigeria, Rwanda and Zimbabwe) are being funded as well as 11 faculty research papers of scientists working in AERC partner institutions (from Cameroon, Eswatini, Ghana, Kenya, Malawi, Uganda and Zimbabwe). The research outputs were presented and discussed at a series of virtual seminars in 2021 (see below). The faculty research papers will be published in a Special Issue of the African Journal of Agricultural and Resource Economics.

<sup>12</sup> LaRue et al. (2021) [Who Wants to Farm? Answers Depend on How You Ask: A Case Study on Youth Aspirations in Kenya](#)

<sup>13</sup> Ogunjimi et al. (2021) [The farming question: Intergenerational linkages, gender and youth aspirations in rural Zambia](#)

### WP 3: Engaging with food and agriculture policy making to enhance food and nutrition security

This work package focuses on identifying and implementing strategies to support **policy reforms related to agricultural innovation, rural development and food security in Africa**. The target audience includes policy-makers engaged at national, sub-regional and continental levels in Africa as well as global policy processes that shape the framework conditions for African agriculture, such as trade, investment and climate change policies. In addition to the cluster leaders, key African players to engage in this context will include the African Union, NEPAD, the regional economic communities, national policy think tanks and the Malabo-Montpellier Panel.

#### a) Political and institutional framework conditions

Studying the agricultural transformation pathways of Africa and India can provide useful insights to inform future strategic directions in food system transformation. Comparing the two regions at an aggregate level would not be meaningful, however. Instead, PARI research **compared Indian states and African countries to study their distinct agricultural growth trajectories**.<sup>14</sup> The research shows that almost all Indian states and African countries have experienced substantial agricultural growth since 2000, but the drivers of agricultural growth differed: Agricultural intensification was the main driver in India while many African countries made use of agricultural area expansion to increase output. Gains in productivity and progress in structural transformation, rather than pure intensification, proved essential to achieve sustained impacts on food and nutrition security. In addition, nutrition outcomes are also driven by other interconnected factors, including synergies with related sectors, such as water and sanitation as well as women's education.

What is driving agricultural transformation in African countries and Indian states?

PARI research in Benin, Kenya, Nigeria and Mali also assessed the **perceptions of stakeholder from the public, private and third sectors (civil society) on the future of agricultural transformation across Africa**.<sup>15</sup> Many stakeholders felt that mechanization and digital tools are essential to promote agricultural transformation on the continent. However, they also perceive risks that have to be addressed. The results also reveal some hitherto neglected aspects. Examples include the role of animal traction as part of agricultural mechanization strategies and the continued appeal of state-led mechanization – despite the perception that such strategies do not work. Regarding digital agriculture, the stakeholders expressed high hopes – which have yet to materialize – but also concerns about a digital divide. Paying more attention to the perspectives of local stakeholder groups will help to choose and design the most promising policies and ensure their implementation on the ground.

How do African stakeholders perceive the future of agricultural transformation in Africa?

#### b) Strengthening multi-actor partnerships and pan-African networks

PARI continued to strengthen its existing pan-African networks in the current phase of PARI. Particular emphasis was placed on linking and building the capacities of **AGRODEP members** through joint workshops and research development as well as mentoring by senior AKADEMIYA2063 researchers. Moreover, widespread outreach activities and dissemination of PARI research findings among **FARA's**

<sup>14</sup> [PARI Policy Brief No. 30](#): Comparing African Countries and Indian States. Lessons for promoting agricultural growth, employment and food security

<sup>15</sup> Daum et al. (2021) [Mechanization, digitalization, rural youth: Stakeholder perceptions on mega-topics for African agricultural transformation](#)

**extensive network of policy actors** in Africa served to raise awareness of PARI among key stakeholders, engage new researchers in PARI activities and foster linkages between the research community and policy makers.

Research and capacity building initiatives outlined above also sought to strengthen and expand pan-African research partnerships. The **collaboration with AERC** serves to build a network of researchers working on issues related to agricultural and rural development in Africa. PARI researchers directly engaged with students and faculty members to provide input into research activities, co-publish articles and participate in training activities. In addition, through the collaborative research with **partners in the Sahel region**, including the partnership with the Agrhymet Regional Centre of the Permanent Interstate Committee for Drought Control in the Sahel (CILSS), PARI has significantly strengthened its research network in the region.

### c) Evidence-based input into high-level African policy fora

#### *Research publications*

Download statistics show that PARI publications are attracting much attention among policy stakeholders. In particular studies published and circulated through the FARA network are reaching a large audience of primarily African readers (Table 1).

Table 1: Download statistics for selected PARI publications published by FARA

Title	Downloads	Hits
Strategies for Scaling Agricultural Technologies in Africa	3.756	11.723
Innovation Opportunities in Small Ruminants Livestock Sector in Benin	992	3.911
The Status of ICT Infrastructure, Innovative Environment and ICT4AG Services in Agriculture, Food and Nutrition in Kenya	942	6002
A Review of Youth Employment Initiatives in Ghana: Policy Perspective	824	6668
Enhancement of Employment and Income Opportunities for Rural Youth in Ethiopia: A Review of Four Large Youth Employment Initiatives	797	5078
Innovation opportunities in Mango Production in Mali	755	1279
Status and Readiness for ICTs in Ghana's Agriculture	725	3416
Innovation opportunities in Sweet potato Production in Kenya	633	1043
Assessment of Youth Employment Initiatives in Malawi: Implementation Realities and Policy Perspective	453	2536
Innovation Opportunities in The Poultry Livestock Sector in Benin	451	787

as of January 2022

#### *Policy Briefs*

- [PARI Policy Brief No. 30](#): Comparing African Countries and Indian States. Lessons for promoting agricultural growth, employment and food security
- [PARI Policy Brief No. 29](#): Towards a Digital One-Stop-Shop for African Producers? Strategic Decisions of Digital Agricultural Platform Providers
- [PARI Policy Brief No. 28](#): Resilience of Africa's Food and Beverage Manufacturing Sector. Evidence from the Covid-19 Pandemic
- [PARI Policy Brief No. 27](#): Covid-19 causes unprecedented Migrant Crisis in India

## Policy Events

Due to the Covid-19 pandemic, PARI events in 2021 were primarily held virtually. Highlights included:

**19 January**

### **Virtual event: Rural Development, Agricultural Livelihoods and Job Creation in the Sahel Region**

In collaboration with Agrhymet-CILSS, PARI launched the national cases studies and regional synthesis report on rural development, agricultural livelihoods and job creation in the Sahel Region published (see above).

**26 November**

### **Virtual Event: Africa and India – Experiences with transformation of food and agriculture and opportunities for learning and collaboration**

This virtual events was organized by ICRIER, FARA and ZEF to discuss opportunities for fostering India-Africa learning and collaboration to promote food and nutrition security in the two global regions. Specifically, the workshop focused on innovations and conducive framework conditions to (1) scale promising innovations that increase productivity and domestic food supplies, (2) strengthen the resilience of national and regional food systems, and (3) ensure that policies and investments to improve food and nutrition security contribute to employment and income generation. Close to 300 participants joined the event overall, half dialling in from Africa and a quarter from India.



Joachim von Braun, Ashok Gulati, P.K. Joshi, Assefa Admassie, Oluwale Fatunbi, Yemi Akinbami

**15-16 December**

### **Virtual PARI Workshop series: Innovations for agriculture growth, food systems transformation and food security in Africa**

The PARI research teams presented key findings from the current phase of PARI in a series of online workshops. The topics included:

- (1) Documenting the digital transformation of African agriculture: Use and impact digital technologies among agricultural intermediaries,
- (2) Made in Africa – Making local agricultural machinery manufacturing thrive
- (3) How to enhance youth engagement in productive employment in agribusiness in Africa? A youth perspective
- (4) How can poultry businesses success be leveraged for the expansion of the poultry sector in Africa?

Overall, around 300 participants from almost 40 countries joined the workshop. The events had been targeted specifically at African stakeholders, drawing on FARA's and AKADEMIYA2063's extensive networks to publicise it. As a result, 80 percent of participants were based in Africa.



PARI team members at the internal planning meeting on 17 December

#### A series of virtual and hybrid seminars were organized as part of the collaboration with AERC:

- **Research colloquia/seminars** jointly held with the ZEF/University of Bonn to review research work-in-progress for both the graduate students and the faculty (11 March, 2 July, 30 September, 14 October)
- **Thesis dissemination workshops** in Kenya (on 12 March for graduates of the University of Nairobi), Tanzania (on 20 October for graduates of the Sokoine University of Agriculture) and Zimbabwe (on 10 November for graduates of the University of Zimbabwe). An average of 40 stakeholders attended each of the workshops whose composition included small holder farmers, academia, agricultural extension staff and non-governmental organizations.
- On 8 November, the **eastern and southern Africa Regional Policy Forum**, whose theme was "Innovation for Agricultural Productivity" disseminated policy-relevant research generated by the AERC faculty researchers to middle-level policy makers and other stakeholders in the rural development subsector.

A selection of other key events where PARI research was presented include:

23-24 February      **Digitainable Forum:** Mindful use of Digitalization and Artificial Intelligence (D&AI) for the SDGs: Presentation on "Towards achieving SDG2: The potential of D&AI to build supply-side capacities in the African food and agriculture sector" (Heike Baumüller)



3 March	<b>Alliance for a Green Revolution in Africa (AGRA)</b> Webinar on “Build back better after Covid”: Participation in the panel (Joachim von Braun)
15 April	<b>PARI Seminar</b> to discuss the AKADEMIYA2016-led study “Firm-level innovation, productivity growth and employment in Sub-Saharan Africa”
22-25 June	3rd Annual International Conference organized by Machakos University, Kenya: Presentation on “Strategies for Promoting Sustainable Agriculture and Food Security in times of pandemics: Innovation, Investment and Policy Priorities” (Oliver Kirui)
8-9 July	<b>Science Days</b> organised by the Scientific Group of the United Nations Food Systems Summit and the FAO: Presentations and participation in panel session (Joachim von Braun, Heike Baumüller, Oliver Kirui)
13 July	<b>Ministerial African Conference on Food Systems Summit</b> : Presentation on “Science for Food Systems Transformations” (Joachim von Braun)
17-31 August	<b>31st virtual International Conference of Agricultural Economists</b> : Presentations on “Identifying the Best Approaches to Achieving Multiple Policy Goals – the estimation of costs to end hunger using the Marginal Cost Curve Approach (Joachim von Braun), “Impact of Covid-19 on Africa’s food and beverage manufacturing companies: Evidence from selected African countries” (Heike Baumüller and Zaneta Kubik), “Productivity Growth and the Role of Mechanization in African Agriculture” (Oliver Kirui)
14-16 September	<b>Tropentag</b> : Presentation on “A New Approach to Classify Livestock Farming Systems in Sub-Saharan Africa” (Sarah Graf, Thomas Daum, Regina Birner) and “Intergenerationality, Gender and Youth Aspirations in Zambia: Shifting Agricultural Paradigms for a Sustainable Future” (Oluwafemi Ogunjimi, Thomas Daum, Juliet Kariuki, Regina Birner)
28-30 September	<b>Food Systems for New Realities - Agri4D 2021</b> , a virtual conference by the Swedish University of Agricultural Science (SLU) and the Swedish International Agriculture Network Initiative (SIANI): Presentation on “Uber for tractors? Digital innovations for mechanization service markets in India and Nigeria” (Thomas Daum)
1 October	<b>FAO side-event to CPO-26</b> : Presentation on “Agri-food systems transformation in times of climate change and pandemics: what role for science?” (Joachim von Braun)
5-7 October	<b>LDC Future Forum</b> organized by the UN and UNU WIDER: Presentation on "Foreign direct investment in the African food and agriculture sector: trends and determinants" (Zaneta Kubik)
15-17 November	<b>ReSAKSS Annual Conference</b> “Building resilient African food systems after COVID-19”: Participation in panel discussions on “Measurement Issues” (Heike Baumüller)
22-26 November	<b>Malabo Policy Learning Event (MAPLE) and the 17th CAADP Partnership Platform (CAADP PP) Meeting</b> : Presentation on “Strengthening systemic capacity to help “build back better” and accelerate progress towards ending hunger in Africa by 2025 – Capacity Building and Skills Development” (Oliver Kirui)
13 December	<b>Meeting of the Wissenschaftsrat (German Science Council)</b> : Speech on „Perspektiven der Agrar- und Ernährungsforschung in Germany“ (Joachim von Braun)



## Social Media Outreach

PARI is using social media, notably Twitter and Facebook, to disseminate key research findings, including through dedicated social media accounts hosted by PARI as well as through accounts hosted by PARI partners. **FARA's communication channels** play a critical role in reaching key African stakeholders. The most extensively used channel are FARA's DGroups which allow direct dissemination of research outputs to almost 40'000 members across Africa. In addition, the FARA website attracted 1.85 million visits in 2021. The FARA Twitter account is followed by over 31'000 users while the FARA Facebook page has 77'000 and the LinkedIn page close to 18'000 followers.

In addition, PARI operates its own social media accounts. The **Twitter account @PARI\_ZEF** had grown to 3081 by December 2021, up 278 followers compared to December 2020. The number of visitors to the PARI Twitter page grew considerably in 2021, reaching its highest value of 10'400 page visitors in July (compared to around 800 viewers who visited the page at the peak in 2020). PARI's tweets reached between 3'800 and 19'000 impressions per month. The study "Resilience of Africa's Food and Beverage Manufacturing Sector" proved a successful paper with tweets generating 5'448 impressions and 263 engagement. A selection of successful PARI Tweets are presented in Figure 3.

The PARI team also disseminated research findings via external websites. For instance, the article "[Tractors can change farming in good ways and bad: lessons from four African countries](#)" published in *The Conversation* by Thomas Daum attracted almost 30'000 readers primarily from South Africa, Kenya and the US, while the article "[How young Kenyans feel about farming goes against conventional wisdom](#)" reached over 6000 readers, with a third of them based in Kenya.

Figure 3: Examples of successful PARI Tweets

 <p><b>PARI @PARI_ZEF</b> Subscribe to the PARI Newsletter! 📧</p> <p>Keep up to date with the latest PARI <a href="#">#publications</a> and <a href="#">#news</a> by subscribing to our email <a href="#">#Newsletter</a>.</p> <p>You can find previous issues of the newsletter and subscribe below:</p> <p><a href="https://research4aginnovation.org/newsletter/pic.twitter.com/4hDv5ABW0n">https://research4aginnovation.org/newsletter/pic.twitter.com/4hDv5ABW0n</a></p>	Impressions	5,231
	Total engagements	54
	Likes	14
	Link clicks	14
	Detail expands	11
	Profile clicks	6
	Media engagements	5
	Retweets	4
 <p><b>PARI @PARI_ZEF</b> We are thrilled to announce the virtual seminar: Agricultural <a href="#">#Innovation</a> for Productivity &amp; <a href="#">#Employment</a> organized together with <a href="#">@AERCAFRICA</a> <a href="#">@ZEFbonn</a></p> <p>📅 Date &amp; time: July 2, 2021   12:00 - 1:50 PM CET</p> <p>📄 More info: <a href="https://bit.ly/Agrievent1">https://bit.ly/Agrievent1</a> <a href="pic.twitter.com/bbAVXZwRdw">pic.twitter.com/bbAVXZwRdw</a></p>	Impressions	3,426
	Total engagements	140
	Media engagements	40
	Detail expands	37
	Link clicks	21
	Profile clicks	16
	Retweets	13
	Likes	13





**PARI @PARI\_ZEF**  
[@PARI\\_ZEF](#) & [@ZEFbonn](#) Publication  
 from Feb 2021

The study uses three-country case studies to discuss the structure, functioning, objectives, and financing of farmers organizations in [#Senegal](#), [#Uganda](#) and [#Zambia](#).

Read the full Working Paper here:  
<http://bit.ly/FOsAgri>  
[pic.twitter.com/AID166W8Xc](http://pic.twitter.com/AID166W8Xc)

Impressions	3,081
Total engagements	73
Media engagements	23
Likes	12
Retweets	11
Detail expands	10
Link clicks	9
Profile clicks	7
Replies	1



**FARA Africa @FARAinfo**  
 Our [#Publication](#); Strategies for Transforming Smallholder Farming in Africa, is one of our latest books highlighting our commitment to Feeding Africa [#FeedAfrica](#) [#FoodSystems](#) [#FARAAfrica](#) [#FARAinfo](#)  
 Download here [📄](#)  
<https://library.faraafrica.org/2020/12/17/strategies-for-transforming-smallholder-farming-in-africa-ofatunbi/> ... [pic.twitter.com/3qMt3uwTcM](http://pic.twitter.com/3qMt3uwTcM)

Impressions	2,556
Total engagements	97
Link clicks	30
Media engagements	26
Likes	17
Retweets	10
Detail expands	9
Profile clicks	5

### 3. Publication List 2021

Publication Title	Lead partner	Geography
<a href="#">Decentralized Seed Services in Africa: An Assessment of Tanzania and Uganda</a>	ZEF / TASAI	Tanzania, Uganda
<a href="#">Climate Change and Food Security in West Africa</a>	ZEF / UCAD / WASCAL	West Africa
<a href="#">Sources of value creation in aggregator platforms for digital services in agriculture – insights from likely users in Kenya</a> (journal)	ZEF/ University of Nairobi	Kenya
<a href="#">COVID-19: Emergence, spread and its impact on the Indian economy and migrant workers</a>	ZEF/ICRIER	India
<a href="#">From Potentials to Reality: Transforming Africa's Food Production</a> (book published by Peter Lang)	ZEF / AKADEMIYA2063	Africa
<a href="#">Land, Climate, Energy, Agriculture and Development in the Sahel: Synthesis paper of case studies under the Sudano-Sahelian Initiative for Regional Development, Jobs, and Food Security</a>	ZEF / CILSS	Africa
<a href="#">Burkina Faso – Land, climate, energy, agriculture and development</a>	ZEF	Burkina Faso
<a href="#">Ethiopia – Land, climate, energy, agriculture and development</a>	ZEF	Ethiopia
<a href="#">Mali – Land, climate, energy, agriculture and development</a>	ZEF	Mali
<a href="#">Niger – Land, climate, energy, agriculture and development</a>	ZEF	Niger
<a href="#">Nigeria – Land, climate, energy, agriculture and development</a>	ZEF	Nigeria
<a href="#">Senegal – Land, climate, energy, agriculture and development</a>	ZEF	Senegal
<a href="#">Sudan – Land, climate, energy, agriculture and development</a>	ZEF	Sudan
<a href="#">Role of Farmers' Organizations in Agricultural Transformation in Africa: Overview of Continental, Regional, and Selected National Level Organizations</a>	ZEF	Africa, Senegal, Uganda, Zambia
<a href="#">The Nexus of Production Diversity, Market Participation and Dietary Diversity: Insights from Ethiopia</a>	ZEF	Ethiopia
<a href="#">Determinants of uptake and strategies to improve agricultural insurance in Africa: a review</a> (journal)	ZEF	Africa
<a href="#">Comprehensive Livestock Driven Typology for Food and Nutrition Security in Mali</a>	AGRODEP / A2063	Mali
<a href="#">Edible weeds and food and nutrition security in the face of the herbicide revolution</a>	University of Hohenheim / BOKU	Zambia
<a href="#">Of milk and mobiles: Assessing the potential of cellphone applications to reduce cattle milk yield gaps in Africa using a case study</a> (journal)	University of Hohenheim	Africa, Kenya
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Forthcoming in spring 2022

Publication Title	Lead partner	Geography
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Use of information and communication technologies (ICTs) by intermediaries in the agriculture sector: Insights from Nigeria	FARA	Nigeria
Use of information and communication technologies (ICTs) by intermediaries in the agriculture sector: Insights from Kenya	FARA	Kenya
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