Digitally Enabled Resilience and Nutrition Policy Innovations (DERPIn) Project

Data solutions and policy innovations to strengthen food systems resilience in Africa

MALABO MONTPELLIER PANEL

Africa **Ag**riculture **Wa**tch
By AKADEMIYA2063

Digitally Enabled Resilience and Nutrition Policy Innovations (DERPIn) Project,

commissioned by the German Federal Ministry for Economic Cooperation & Development (BMZ), is part of the Fund for the Promotion of Innovation in Agriculture (i4Ag), and being carried out by **AKADEMIYA2063** on behalf of the **Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.**

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1. Background: The Challenge

Countries in Africa are among the most vulnerable to climate shocks in the world. Extreme weather events destroy assets and upend livelihoods, while changing weather patterns disrupt food systems activities, resulting in uncertain planting periods and poor yield performance, among others, in turn negatively impacting communities' food security and nutrition status, in both rural and urban areas.

High levels of vulnerability and low absorptive capacity compound the disruptive effects of climatic and other socio-economic shocks. The vulnerability of agricultural and rural communities originates partly from severely limited access to timely, reliable, and spatially disaggregated data, including future-oriented forecasts, for adequate preparedness and planning purposes. Existing techniques and methodologies insufficiently capture ongoing and future crisis dynamics and undermine better informed decision-making.

The real challenge facing African countries is hence the lack of capacity to anticipate and respond to changes and shocks such that they do not result in widespread suffering and irreversible damage to livelihoods. It is imperative to delink vulnerability from large-scale and permanent disruption by enhancing countries' capacity to innovate and craft more effective and timely resilience-building policies and programs.

This starts with tools, data, and analytics to (i) clearly understand and track the drivers of vulnerability at a disaggregated community level and across social strata; (ii) predict how different shocks may affect livelihoods, and the related distribution of assets, access to services and power relationships; and (iii) adapt and adjust policy solutions to the changing nature of shocks, their locus, severity, and transmission channels.

African countries must overcome infrastructural, institutional, and technical constraints that are hampering the planning and implementation of resilience policies that respond effectively and at scale to the complexity of shocks.

Digital technologies provide a real opportunity to rapidly identify innovative and lower-cost solutions.

Across Africa, advancements in digital infrastructure, big data, machine learning, and artificial intelligence (AI) can be leveraged to create the tools and analytical content to untangle the complex web of interaction between food systems disruption and community livelihoods.

AKADEMIYA2063 proposes the creation of a suite of data solutions to support policy innovation to address the challenges posed by climate change for food and nutrition security in Africa.

2. The DERPIn Approach

The Digitally Enabled Resilience and Nutrition Policy Innovations **(DERPIn)** project creates an integrated, customizable digital infrastructure to enhance the technical capacities of food system actors in African countries to innovate and design policy solutions that respond more effectively to the complex and changing nature of shocks and their consequences.

The solutions developed in this project derive from participatory approaches that involve local stakeholders and beneficiaries – both, in the selection and format of input data as well as the types of outputs in order to ensure relevance and to increase the accessibility and use, including by smallholder farmers (through, for example, farmers' organizations).

The **DERPIn** project approaches policy innovations and digital tools for sustainable food systems transformation from three angles:

Planet	People	Prosperity

Policy innovation within the context of this project is defined as *the capability and the agility to formulate and execute policies that respond effectively to emerging or unresolved development challenges and function as an enabler to seize opportunities in both cases as context and circumstances change.*

The project is leveraging the body of data, analytical evidence, and digital resources within **AKADEMIYA2063** to bolster the capacity of government and value chain actors to design impactful solutions for the sustainable transformation of African food systems.

The integrated digital infrastructure links the biophysical, agricultural, vulnerability, and nutrition data and analytical tools for broader accessibility by and use for key stakeholder groups across all project countries. This will be complemented with a portfolio of learning, exchange, and dialogue events and activities to deploy and apply the resources embedded in the digital platforms. A series of customized and stakeholder-specific knowledge products and advisory services will be developed in consultation with key government agencies and main non-state actor groups.

In doing so, the **DERPIn project** responds directly to the broader African agenda laid out in:

The Malabo Declaration

The AU Common Position on Food Systems Transformation

The AU Climate Change Strategy

The African Green Recovery Action Plan

Food systems transformation and resilience policy innovation

Realigning the African agenda, in particular the Malabo agenda, to reflect the post-UNFSS and UNFCCC ambitions requires smart synchronization of frameworks, policies, and programs that will ensure that resources are directed efficiently and that outcomes are positive for the food system, environment, and societies. Success in doing so and at scale requires data, analytics, and tools for learning, exchange, and innovation at the highest levels of policymaking to craft game-changing, transformative solutions and expedite implementation.

Digital innovations for food systems transformation and resilience

The design and implementation of effective food systems transformation and resilience policies must deal with the complexity and geographic dispersion of food systems' components and actors in the context of limited institutional capacity and considerable infrastructure constraints. Digitally enabled innovations not only allow to overcome the above obstacles but to also do so at a lower cost and within a short timeframe. **The digital infrastructure to be developed under the DERPIn project provides access to relevant evidence and advisory services in key food systems and resilience agenda areas such as adaptation, nutrition, vulnerability, gender, etc.**

AKADEMIYA2063's [Africa Agriculture Watch (AAgWa)](#) platform is a web-based portal built around the Africa Crop Production (AfCP) model which applies machine learning techniques to modeling bio-geophysical processes. The AAgWa platform currently provides biophysical (such as vegetation, precipitation, land surface temperature, biomass, soil moisture etc.), production, and yield forecasts for nine crops across 47 African countries. This project will expand the existing toolbox through the development and deployment of customized AAgWa platforms adapted to the local context.

Existing platforms providing access to remote sensing products lack the predictive capacity built into the AAgWa toolbox and face sustainability issues in terms of maintenance and continuity. The proposed approach advances the remote sensing products using AI and machine learning techniques to generate production forecasts and other farm-level changes for major, strategic crops. **The platform will be targeted to a wide range of beneficiaries, in particular farmers, farmers' organizations, government agencies, and the private sector. Communication channels and capacity-building activities will be established to reach each group.**

Climate change mitigation and adaptation

High exposure and limited readiness mean that African countries are highly vulnerable to climate change and related shocks. More than 50 African countries have signed the Paris Agreement and submitted Nationally Determined Contributions (NDCs) and National Adaptation Plans (NAP). A lack of data and analytics to clearly define and track the various targets embedded in countries' ambitions is a major hurdle to the successful implementation of mitigation and adaptation programs. **The DERPIn project is building on the pioneering work on big data and AI at AKADEMIYA2063 to inform and guide policy innovation for resilience.**

Community vulnerability and response capacity

As part of its COVID-19 response work, AKADEMIYA2063 has developed an innovative method of evaluating and mapping vulnerability levels across local communities. The current vulnerability indicator includes metrics related to poverty, food security, child malnutrition, disease prevalence, and access to health services.

The DERPIn project proposes an expansion of the methodology devised for its COVID-19 work to include climate exposure and nutrient adequacy, thereby creating a more comprehensive picture of vulnerability.

Inclusive nutrition policies and interventions

The nutritional status of households in vulnerable communities is one key indicator that could guide resilience policies to protect and track changes in livelihoods resulting from shock. Most African countries currently experience high levels of malnutrition in multiple forms, of which nutrient deficiency, also known as "hidden hunger", is one of the most insidious due to the difficulty of observing and monitoring it. Shocks to the food system, even when short-lived, can have serious, irreversible, and often invisible or overlooked nutritional consequences, transmitted through impacts on food production, prices, and incomes. A better understanding and monitoring of the effects of shocks on household nutritional status in vulnerable communities would support resilience policies to not only protect livelihoods in the short term but also tackle the long-term consequences.

Tools and methodologies to generate disaggregated, high-quality data and analytics around household-level nutritional status can enhance the capacity of African countries to design and execute inclusive and impactful development and crisis response policies. AKADEMIYA2063's Nutrition Smart Processing and Trade Project (NSTP) generates evidence to guide the formulation of policies and strategies to increase the capacity of African food systems to provide sufficient nutritious food for consumers. The DERPIn project will draw extensively from NSTP and engage closely with state and non-state actors at continental, regional, and national levels to ensure that the analysis directly responds to national nutrition priorities and that results can be taken up to inform policies and investments.

Understanding, learning from, and replicating positive change

Innovation at the highest levels of government can expedite implementation and contribute more effectively to the transformation of Africa's economies. This is particularly important within a context of constrained public resources and the need to avoid costly failed experiments. Learning from success can drive transformative change across Africa's food systems more effectively and accelerate innovation elsewhere. Identifying best practices across the continent in terms of policy and institutional innovations and programmatic interventions on the ground that can be brought to scale and replicated elsewhere on the continent enables progress more rapidly, sustainably, and at scale.

In this respect, the Malabo Montpellier Panel, and a set of other complementing activities including the Malabo Montpellier Forum, seek to guide policy choices by African governments and institutions.
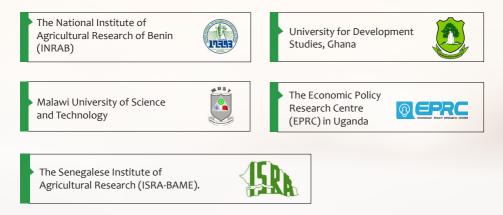
The Panel does so by providing high-quality research and science to equip decision-makers with the evidence and knowledge to develop and implement policies and programs that benefit economic growth and food systems transformation on the continent, particularly within the context of a rapidly changing climate. **The DERPIn project allows AKADEMIYA2063 to apply and complement the approach of the Malabo Montpellier Panel and its associated Malabo Montpellier Forum and to harness the experience to build in other thematic areas and across countries.**

The Malabo Montpellier Panel convenes 18 leading experts in agriculture, engineering, ecology, nutrition, and food security to facilitate policy choices by African governments in order to accelerate progress toward food security and improved nutrition. The Panel identifies areas of progress and positive change across the continent and assesses what successful countries have done differently. It identifies the institutional and policy innovations and programmatic interventions that can best be replicated and scaled by other countries. The related Malabo Montpellier Forum provides a platform to promote policy innovation; it uses the evidence produced by the Panel to facilitate dialogue among high-level decision-makers on African food systems transformation.

3. Implementation, Project Activities, and Expected Outcomes

Starting in January 2023, the project is implemented over a two-year period jointly with the Pan-African Farmers' Organization (PAFO) in five African countries: Benin, Ghana, Malawi, Uganda, and Senegal. To ensure a targeted and context-specific delivery of the project, DERPIn will engage PAFO regional and national members and has partnered with national partners in each of the project countries:

The National Institute of Agricultural Research of Benin (INRAB)

University for Development Studies, Ghana

Malawi University of Science and Technology

The Economic Policy Research Centre (EPRC) in Uganda

The Senegalese Institute of Agricultural Research (ISRA-BAME).

The DERPIn project will deliver new open-source web-based tools; demand-led, targeted advisory services; and customized knowledge products such as toolkits, technical notes, and briefing papers as well as policy innovation packages. These products will complement the use of digital platforms, mobile applications, broadcasting, and other traditional communications tools – developed using a participatory approach – to support the effective delivery and implementation of the activities.

DERPIn targets five main stakeholder groups: senior government representatives; policy analysts and planners; smallholder farmers and farmer organizations; private sector operators; and research and academic institutions.

The target groups will receive capacity building in nutrient adequacy and vulnerability measurement, mapping and analysis, and remote sensing products, predictive modeling outputs, and their potential use on the ground for policy and program design and implementation.

Specifically, training will be provided on: (i) tools and methods for nutrient gap analysis; (ii) tools and methods for community vulnerability analysis; (iii) basics of remote sensing products for agriculture; (iv) the interpretation of vegetation indices for plant heath; (v) the interpretation of the crop classification map; and (vi) the use of the customized AAgWa, digital nutrient and vulnerability platforms for decision-making. Customized analytical products and advisory services will be developed in direct and close collaboration with smallholder farmers and their organizations.

A set of six project activities will guide the implementation of DERPIn over the two-year project lifetime.

Project Activity 1:
A country-specific customized AI platform for biophysical data and crop modeling to inform gender-sensitive and inclusive policy for food system resilience is being developed and made operational (AAgWa).

Project Activity 2:
Analysis and modeling of micronutrient adequacy gaps as a key indicator of livelihood status and launch of the nutrient adequacy portal for better targeting of food system resilience policies.

Project Activity 3:
Expansion of the vulnerability indicator to map household and community level vulnerability and launch of an interactive digital platform for vulnerability tracking and analysis.

Project Activity 4:
Development and deployment of integrated digital infrastructure linking biophysical, production, nutrition, and vulnerability assessments.

Project Activity 5:
Policy innovation packages and communications and outreach activities for knowledge-sharing and mutual learning to improve gender-sensitive and inclusive resilience policy innovation and design.

Project Activity 6:
Capacity building through training sessions to cover tools and data related to crop production forecasting as well as nutrient adequacy and vulnerability analysis and tracking.

AKADEMIYA2063
Kicukiro/Niboye KK 341 St 22
P.O. Box 1855
Kigali-Rwanda
+250 788 318 315
kigali-office@akademiya2063.org
www.akademiya2063.org

Pan-African Farmers' Organization
Bibare, KG125, House No. 88,
Kimironko
Kigali-Rwanda
+250 733202069/733202070
info@pafo-africa.org
www.pafo-africa.org