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An ecosystemic framework for analysing evidence-informed policy systems for agricultural transformation

Case study of Benin

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Food and Agriculture Organization of the United Nations

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Abstract

The production and use of evidence for agricultural policy is critical to prioritizing and targeting effective agricultural transformation reforms in African countries. International development organizations have supported programmes that promote evidence-informed policies, however, this support has often been focused on short-term and externally driven solutions, with limited impact in the long run. Faced with this scenario, there is now a growing interest in the role of resilient and sustainable national systems that can generate organic evidence-informed agricultural policy. Yet, there is limited knowledge on how to map out and analyse such systems, which is critical to fostering their emergence and the later uptake of evidence in policymaking. This study draws on ecological science and social network analysis to develop and test a framework that can help understand evidence-policy systems and their potential to sustainably promote evidence-informed policymaking in the agricultural sector. Applying this framework in Benin, the study found that beyond the Ministry of Agriculture, other organizations produce, broker or use evidence such as data, research, evaluation and expert knowledge in a context that is influenced by the institutional rules and setup, the incentives in place and the funding landscape. Furthermore, the paper analyses the sustainability of the evidence-policy system in Benin through its power, resilience and capability. Finally, it provides policy recommendations with the key entry points to improve on and how a system like this can be used to improve agricultural policymaking.

Keywords: ecosystem, evidence, policy, agriculture, social networks, Benin.

JEL codes: D80, Q18, Q28.

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1 Introduction

Agricultural transformation is defined in this paper as “the process by which an agri-food system transforms over time from being subsistence-oriented and farm-centred into one that is more commercialized, productive and off-farm centred” (Laborde *et al.*, 2019, p.2). This modernization leads to higher agricultural productivity, release of labour towards industry and services, gradually transforming the economy from a dominantly rural and low-productivity agrarian system to one that is dominantly urban and non-agriculture (Mellor, 2017). It is essential for reducing poverty and inequality and creating opportunities for all people to lead healthy and productive lives. Governments have an important role in driving this transition process, but policymakers face difficult trade-offs, for instance, on how to raise – and where to invest – public resources, and how involved and what parts of the economy they should regulate.

In Africa, which is home to 23 out of 29 low-income economies (World Bank, 2020), governments face a double challenge: economies often are at the initial stage of agricultural transformation (Laborde *et al.*, 2019), and the State has constrained resources and capacities to foster the transition. Therefore, it is especially critical for African governments to prioritize and target effective policy reforms for agricultural transformation that will lead to productivity gains in land and labour, increasing farm-gate incomes, fostering demand for the rural non-farm sector, and feeding labour to the urban service and industrial sectors (Mellor, 2017).

One way to do it is through evidence-policy systems. At national level, an evidence-policy system (EPS) can be defined as a set of institutions and organizations that supply, demand and translate research findings in support of policy positions or options.¹ Actors in the EPS shape policy priorities and make informed cases for their policy preferences by generating, communicating, and using evidence on the costs and benefits of competing reform options. While public policy is, and should be, informed by a wealth of factors beyond evidence (Cairney and Oliver, 2017), sustainable EPS are critical components to the quality of the policymaking process in driving agricultural transformation. Although the capacity of African EPS to generate and use evidence is generally higher than assumed in the international development literature and praxis (Stewart, 2021) they face significant constraints, with evidence often being under-used or misused by policymakers (Broadbent, 2012; Goldman and Pabari, 2021).

International development organizations have extensively supported programmes to increase the availability of evidence or strengthen government capacities to incorporate evidence into policy processes. Yet, these organizations have often focused on short-term and externally driven solutions to vitalize EPS for brief periods. On the other hand, sustainable EPS are resilient, endogenous, and more likely to generate the relevant evidence, at the relevant time, for the appropriate audience and policy issue. Paradoxically, there is a dearth of evidence on how to map out and analyse such systems, which is a critical step towards fostering their emergence because they are more likely to deliver evidence-informed policy.

To fill that gap, the FAO’s Monitoring and Analysing Food and Agricultural Policies (MAFAP) programme developed a framework to map EPS for agricultural transformation in Africa and understand their sustainability. This study tests the framework with the case of Benin’s evidence-policy ecosystem. The objective is to determine, characterize, and analyse how evidence is or can be better and more sustainably embedded in Benin’s agricultural policymaking.

¹ Adapting the works of Davies and Nutley (2008).

The report is organized as follows: Section 1 presents an introduction to the study and section 2 presents the operational and methodological framework used to understand the supply and use of evidence in agricultural policy. Section 3 then looks at the evidence-based policy system (EPS) network and its characteristics and key stakeholders in Benin, and section 4 assesses the network's sustainability. Section 5 and 6 give key insights, recommendations and conclusions to the study's findings.

2 Methodology: an ecosystemic approach to understanding evidence supply and use in agricultural policy

2.1 The ecosystemic approach

This study adopts a systemic approach to move from an interpretation of evidence-informed policy as a linear and transactional process (Court and Young, 2002; Stone, Keating and Maxwell, 2001) to a more holistic understanding of the nexus between evidence and policy (Langer and Weyrauch, 2021). This approach considers research and policymaking organizations as interrelated components of one policy system rather than two groups sitting on each side of a chasm (Stewart *et al.*, 2019).

The framework draws on ecological science to understand the functioning of the EPS and its potential to sustainably promote evidence-informed policymaking in the agricultural sector. Ecology offers a blueprint for natural resource management,² but also several other disciplines that seek to understand systems and their sustainability, among which ecological economics, political science, and sociology. As such, building and expanding on the proposal of (Stewart *et al.*, 2019), the methodological framework presented below mirrors the composition and functioning of ecological systems to analyse the EPS. It translates four dimensions of the ecosystem into the EPS analysis (Table 1).

First, ecosystems have boundaries. The boundaries are defined based on the similarity of species composition and biogeochemical processes over a specific spatial area (Schulze *et al.*, 2019). In the case of an EPS, they are defined by the authors through the geographic area, policy domain and type of evidence considered.

Second, ecosystems are characterized by their non-living (abiotic) and living (biotic) components (Schulze *et al.*, 2019). In the natural ecosystem, key abiotic components would be (i) the climatic and physical factors; (ii) the energy that sets the ecosystem in motion; and (iii) the inorganic and organic matter cycled through the system, i.e. the nutrients. In the EPS, they would respectively correspond to the (i) historical, political, cultural, and economic context; (ii) the institutions, incentives and funding for evidence supply and use; and (iii) the evidence being shared.

² The “ecosystem approach” got traction in the field of public policy since it emerged as the central tenet of the Convention on Biological Diversity in 1995.

Table 1. Dimensions of an ecosystem and correspondence with the evidence-policy system

| Dimension | Ecosystem | Evidence-policy system |
|----------------------------|---|--|
| Boundaries | <ul style="list-style-type: none"> • Species composition • Biogeochemical processes • Spatial area | <ul style="list-style-type: none"> • Policy domain • Geography • Type of evidence |
| Abiotic components | <ul style="list-style-type: none"> • Climatic and physical factors • Energy sources (e.g. sun) • Nutrients | <ul style="list-style-type: none"> • Historical/political/cultural/economic context • Institutions, incentives, funding • Evidence shared |
| Biotic components | Organisms producing, breaking down and consuming nutrients | Organizations producing, brokering and consuming evidence |
| Emergent properties | Sustainability, resilience | Sustainability, resilience |

Source: Authors' own elaboration.

The biotic components refer to the different organisms cycling nutrients through the ecosystem. In the EPS, they can be producers – organisms capable of synthesizing nutrients (policy evidence) from abiotic sources of energy (e.g. funding). They can also be consumers by accessing and consuming the nutrients supplied by producers. Finally, the biotic components can also break down matter into a digestible form for other organisms, reflected by the role of evidence brokers in the EPS.

Third, an ecosystem has emergent properties that develop “on the system as a whole and are not present within any of its components” (Schulze *et al.*, 2019, p.460). These include, fundamentally, the system’s sustainability, that is, its capacity to “survive or persist” (Costanza *et al.*, 1997, p.105).

2.2 Operational and methodological framework

The paper presents an operational and methodological framework anchored in this ecosystemic approach to map and analyse EPS and their sustainability. The framework was tested on the agricultural EPS of Benin. The analysis was broken down into four steps, corresponding to as many dimensions of the EPS:

1. Defining the boundaries for the EPS.
2. Characterizing the ecosystem: the context around evidence-informed policymaking and the sources of energy that set the system in motion. The sources of energy include institutions, formal or informal, that influence organizations into supplying or demanding evidence to inform policy; incentives for key individuals to produce and demand the evidence; and funding to the EPS.
3. Mapping the stakeholders that inhabit the EPS and their relationships around evidence supply, demand and brokering; characterizing the type of evidence being shared.
4. Analysing the sustainability of the ecosystem based on the three previous dimensions of boundaries, context and stakeholders.

Various research methods were applied for each dimension, including literature review, descriptive statistics analysis, key informant interviews and social network analysis. This is

summarized in Table 2. The analytical steps were conducted linearly and refined iteratively as new data and analytical insights were being generated.

Table 2. Operational and methodological framework for analysing evidence-informed policy systems for agricultural transformation

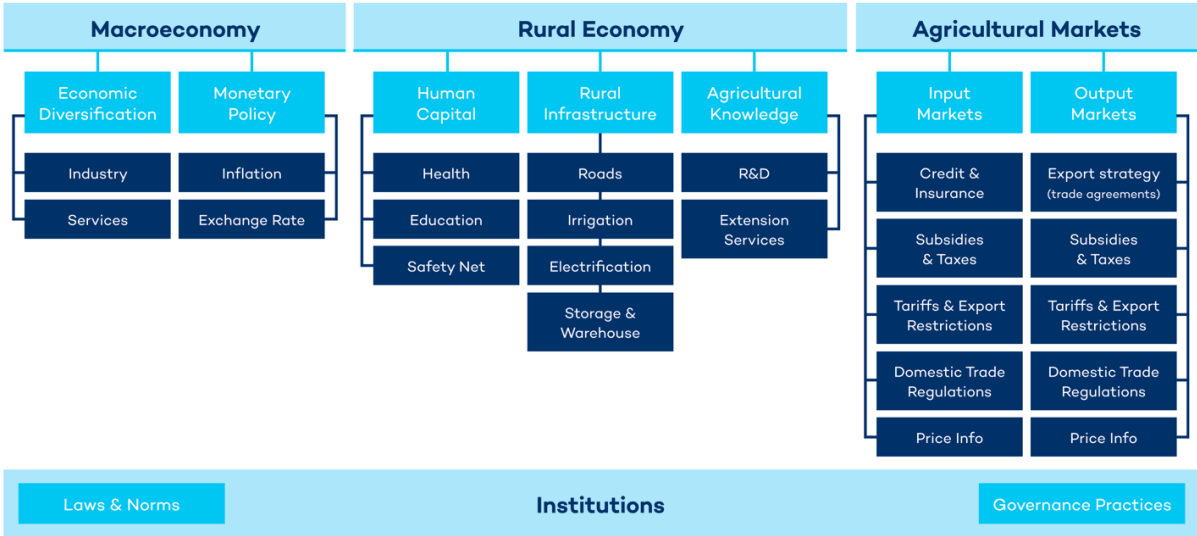
| Evidence-policy system | Dimensions/steps | Elements | Research methods |
|------------------------|-------------------------------------|---|--|
| | 1. Boundaries | <ul style="list-style-type: none"> Evidence (statistical data, research findings, impact evaluation, expert knowledge, and citizen evidence) Geography (both national and sub-national) Policy domains (any of the domains of agricultural transformation prioritized by the Strategic Plan for the Development of the Agricultural Sector (PSDSA) and National Plan for Agricultural Investments and Food and Nutritional Security (PNIASAN)) | <ul style="list-style-type: none"> Literature review |
| | 2. Context | <ul style="list-style-type: none"> Environment (historical, political, economic, and international perspective) Energy (institutions, incentives, and funding) | <ul style="list-style-type: none"> Literature review Key informant interviews Descriptive analysis |
| | 3. Stakeholders and evidence | <ul style="list-style-type: none"> Organizations (producers, consumers, brokers) Evidence supplied, brokered, consumed Relationships | <ul style="list-style-type: none"> Literature review Social Network Analysis Key informant interviews Descriptive analysis |
| | 4. Sustainability | <ul style="list-style-type: none"> Power (institutional framework and funding) Resilience (diversity of organization types and their activities, types of evidence, resilience of the key organizations) Capability (capacity needs, opportunities for addressing capacity gaps) | <ul style="list-style-type: none"> Key informant interviews Social Network Analysis |

Source: Authors' own elaboration.

2.2.1 Setting the boundaries of the evidence-policy ecosystem

The study adopted a broad definition of “evidence”, which encompasses statistical data, research findings, impact evaluation (Goldman and Pabari, 2021) expert knowledge and citizen evidence (Gbedomon, Houessou and Thoto, 2021). The geographic boundaries of the EPS were set at the national and sub-national levels of Benin, although agricultural policy is highly centralized in Benin. The policy domain considered was in accordance with the taxonomy of agricultural transformation policy proposed by (Baliño *et al.*, 2019) (Figure 1). In addition, the Strategic Plan for the Development of the Agricultural Sector 2025 and the National Plan for Agricultural Investments and Food and Nutritional Security 2017–2021 were used as umbrella policies to guide the analysis of the ecosystem.

Figure 1. Policy taxonomy: agricultural transformation



Source: Baliño, B.S., Laborde, D., Murphy, S., Parent, M., Smaller, C. & Traoré, F. 2019. *A Policy Taxonomy for Agricultural Transformation*. Washington, DC, IISD (International Institute for Sustainable Development).

2.2.2 Understanding the context

Literature review and key informant interviews (see step 3) were combined to document the context of the agricultural EPS Benin.

The environment was briefly described from a historical, political, economic, and international perspective. The energy sources were also characterized through three elements: institutions, incentives, and funding.

- Institutions: the laws, regulations and development plans were analysed to understand if and how they offered a solid foundation for an agricultural EPS. The research also explored the institutional setting in place in the agricultural sector at a higher level (e.g. at the Presidency and the Ministry of Planning and Development) and within the Ministry of Agriculture that could foster evidence use.
- Incentives: the study reviewed how the legal framework provided incentives to supply high-quality evidence and how this contributed to the EPS performance. It also reviewed the accountability system in place that could create incentives for evidence use from policymakers.
- Funding: international and national investments in agricultural research and development were analysed.

2.2.3 Mapping the stakeholders and their relationships

The ecosystem mapping was conducted through two complementary exercises: social network analysis and key informant interviews.

Social network analysis

Social network analysis (SNA) methods were used to identify the organizations and map their relationships in the Benin agricultural EPS. Social network research is essentially structured around two approaches. First, an interpretive approach uses social network as “a heuristic to explore how meanings, movements and processes are facilitated by and flow through

relationships”. Second, a formal analytic approach “quantitatively measures relational ties” (Marks and Stys, 2018, p.2).

The research adopted the latter approach. The objective was to map the actors in the Benin case study EPS, characterize them and measure their ties in relation to evidence. In contrast with most social science approaches, which focus on one population of interest, the population of study, in SNA, is threefold: it is the individuals (or groups thereof) – hereafter referred to as *nodes* – their ties and network structures themselves (Robins, 2015). The values for network structure variables were calculated from the node and tie variables’ values, and the focus of the sampling and data collection was, therefore, on nodes and their ties.

Sampling

There are two main types of social networks: egocentric and whole. The former are individual networks, encompassing all the ties to, from and between all the nodes, named *alters*, around one specific individual, the *ego*. The latter are system networks, encompassing all the ties to, from and between nodes within boundaries set by the researcher (Robins, 2015). The evidence-policy system, characterized as a policy network, falls within the second category.

Whole network node sampling can take the form of a predefined census whenever the network is small enough, and boundaries are readily identifiable, for instance, beach-goers or members of a parliament (Marks and Stys, 2018; Marsden, 2012). However, in the case of a policy network, the node population is hidden. Policy network nodes do not share one formal and discrete set of attributes that make them readily identifiable. In the footsteps of other researchers who have studied policy networks (Contandriopoulos *et al.*, 2017; Lewis, 2006; Robins, Lewis and Wang, 2012; Shearer, Dion and Lavis, 2014) a snowball sampling approach was used to overcome this issue.

Using purposive, reputational sampling (Faul, 2016), seed nodes that participate in most stages of the agricultural EPS, based on reputational criteria (i.e. expert knowledge) and positions/functions (i.e. their function, such as being the Ministry of Agriculture) were selected and stratified by type of actor to include donors, academia, research, government and civil society.

The nodes were considered at the organizational, rather than individual level. This choice was made for practical and methodological reasons. An individual EPS network was considered too large to map as it would have involved hundreds of individuals and their interrelations. In addition, it was anticipated that it would lower the value of the exercise by adding excessive noise to the results.

The sampling started with the following organizations considered as seed nodes:

- Faculty of Agricultural Sciences (FSA), University of Abomey-Calavi – Academia
- Faculty of Agronomy, University of Parakou – Academia
- National Institute for Agricultural Research in Benin (INRAB) – Research
- Cosinus Conseil, a consultancy firm involved in strategic planning and operational activities in the agricultural sector – Research
- Ministry of Agriculture, Livestock and Fisheries (Department of planning and forecasting) – Government
- FAO Benin Office – Donor

- World Bank – Donor
- National Platform of Civil Society Organizations in Benin (PASCIB) – Civil society
- National Platform of Agricultural Farmer and Producer Organizations (PNOPPA) – Civil society.

Seed nodes were asked to provide the name of other nodes in the EPS, with whom they had a relationship based on the sharing of agriculture-related evidence. The literature recommends that a name generator is used to identify at least 5 to 7 nodes for each node surveyed (Jessani, Boulay and Bennett, 2016), and more specifically, in the context of policy networks, the minimum number suggested is five (Crona and Parker, 2011). Consequently, each seed node was asked to list, for each role – supplier, consumer, and broker – up to 5 contacts with whom they had the closest relationship in each of the following categories: research community, governmental organizations and civil society organizations. As such, each node could name up to 5 organizations by role (3 roles in total) and, for each role, by category (3 categories in total). This amounted to a total of up to 45 different organizations in their network. However, during data collection, nodes surveyed named far less than 45 different nodes. Each node interviewed referred to an average of six other nodes in their network.

Limiting data collection to a set number of nodes helped identify organizations that have active relationships around evidence production, brokering and use as it motivated the referring nodes to name those they actively collaborated with. However, it constrained the number of organizations that could be mapped. For example, it was not possible for an interviewed government agency node to list all consultancy firms their organization worked with. In such cases, the sampling was focused on representative nodes, for example, Cosinus Conseil for consultancy firms.

Interviews started with the nine seed nodes that identified 17 new organizations. These were interviewed in a second wave, and they generated a third wave of 12 new organizations. After the third wave, only three new organizations were identified, and the team decided to stop the snowball sampling. In addition, the research team conducted a desk review to identify and survey key organizations (ten in total) known to be part of the EPS, but that were not mentioned by the nodes through the name generator. Therefore, the total network sample includes 48 organizations.

Due to the open-endedness of the network, the exponential growth of sampling associated with the snowball method, and limitations on resources to conduct the research, it was not possible to follow through with all the nodes mentioned through the name generator. Therefore, the policy network is not exhaustive and is skewed to data relative to the seed nodes. The hidden nature of the policy network makes it difficult to estimate the extent of the missing node and network data. However, based on key informant interviews conducted by the researchers and their prior knowledge of the Benin agricultural policy environment, the network is considered to capture the core stakeholders of the Benin agricultural EPS and their ties around evidence sharing.

Data collection

In each organization, an individual at a management position with a good overview of the organization's operations was interviewed. Data on three types of variables were collected:

- Descriptive variables characterizing the organization, including the name, geographical coverage, date of creation, formal status, policy stage at which it intervenes.

- Perceptions of their role in the evidence-policy system, including the perceived share of their contribution to supply, demand and brokering roles, the types of evidence produced and demanded, motivations, targets, and format for the evidence.
- Ties with other nodes in the ecosystem (name generator), including the type of evidence mostly shared, the nature of the relationship, the intensity, and the direction of the relationship.

Two variables were also calculated to facilitate the social network analysis:

- Net role of each organization (supplier, broker, consumer, mixed), based on the role percentages reported by the nodes interviewed.
- Numeric intensity of interaction, based on the intensity reported along a nominal scale (low to very high).

The complete list of variables and how they were collected and calculated is provided in Annex A.

Data analysis

The SNA data was cleaned, structured, and imported into Kumu. Kumu is a web-based social network analysis software (see <https://kumu.io>) that helps organize and analyse complex relationship data.

Two types of indicators were generated:

- At the network level, a graphical representation of the evidence policy system network, including all sample organizations and their ties around supplying, consuming, or brokering evidence. The network visualization was produced by Kumu using an algorithm that defines nodes centrality in the visualization based on the number of ties they hold. The network visualization was also colour and shape-signed to indicate the status of organizations (e.g. national, international) and their net role. In addition, two network-level metrics were computed: density and reciprocity. Network density is the proportion of actual connections in a network compared with the potential connections. Reciprocity measures the likelihood of two nodes in a directed network to be mutually linked.
- At the node level, three SNA metrics were calculated to measure each organization's importance in the EPS network:
 - *Degree*: this centrality measure refers to the count of the total number of connections a node has in the network (Hansen *et al.*, 2011). For directed networks, as in this study, two measures of degree are considered (Hansen *et al.*, 2011): indegree, which is the number of connections pointing to a particular node, so supplying the node with evidence and outdegree, which is the number of connections (supply of evidence) that originate from a particular node to other nodes. As such, the degree can be related to the popularity of an organization in the network. However, this popularity measure should be considered cautiously as it does not differentiate between quantity and quality.
 - *Closeness*: this metric nuances the "degree popularity". Closeness measures how far a node is from all other nodes in the network. Mathematically, it is the "average of the shortest path length from the node to every other node in the network" (Golbeck, 2013, p.3). This study uses the inverse of the average distance from one node to the others.

Therefore, higher values indicate that the organization has a central position in the network.

- *Betweenness*: this is the number of shortest paths from all pairs of organizations that pass through that organization (Nguyen, 2014). Therefore, betweenness reflects the capabilities of an organization in serving as an intermediary between two organizations or two sub-parts of the network.

The data yielded from the SNA interviews was also used to describe the key stakeholders and the evidence they share.

Key informant interviews

In addition to the social network analysis, key informant interviews were conducted with 12 organizations. The key informants were selected among senior official policymakers who have a bird eye's view of the EPS ecosystem and individuals with demonstrated expertise on the topic of evidence-informed policy for the agricultural sector in Benin.

The interviews captured the informants' views on the EPS' environment, capacities, and constraints in producing and using evidence. Interview data was coded and analysed to inform sections on the EPS context and sustainability.

2.2.4 Analysing the sustainability of the evidence-policy system

The sustainability of the EPS was analysed through three dimensions, drawing from the findings of the previous sections.

First, the energy sources were critically examined to understand how sustainable they are to keep the EPS powered.

Second, the resilience of the EPS was analysed through its diversity and its ability to respond to threats and shocks.

Third, the capability of the EPS was examined mainly in terms of human resources capacity and capacity gaps at the organizational level.

3 Characterizing the agricultural evidence-policy system in Benin

3.1 Context of the agricultural evidence-policy system in Benin

3.1.1 Environment of the ecosystem

Benin is a lower-middle-income country with a population of 11.5 million people and a per capita income estimated in USD thousand (World Bank, 2020). The political context of Benin is marked by over 30 years of a stable democracy with four presidents, despite some recent electoral tensions in 2019–2020. In general, fundamental freedoms are respected, and the executive, the legislative and the judiciary share the power. Successive governments have improved good governance and fostered socio-economic development, although poverty is still high among the population. In 2019, the poverty headcount ratio at national poverty lines in Benin stood at 38.5 percent (World Bank, 2020).

In the past years, before the coronavirus pandemic, economic growth has been moderate and steady (4 to 5 percent annually) supported by the agricultural sector, among others. The agricultural sector contribution to gross domestic product (GDP) moved from 25.23 percent to 22.64 percent from 2006 to 2018, while in nominal terms, it has increased from USD 1.44 to USD 2.18 billion during the same period (World Bank, 2020). The agricultural sector represented 41 percent of all employment in 2019 (World Bank, 2020), and the sector is dominated by small family farms that are more active in subsistence farming than commercial crops.

Recent agricultural policy history can be traced back to 1990, when the country became a democratic nation and developed the Letter of Declaration of Rural Development Policy (LDPDR) signed in Washington, DC in May 1991. Although it was not evidence-driven – and not based on any strategic analysis (MDEPP-CAG, 2009) – it helped organize the transfer of production, marketing, and processing roles to other stakeholders, including producer organizations and the private sector (Kouakanou *et al.*, 2020). Ten years later, in July 2000, the Declaration of Rural Development Policy (DPDR) was adopted as a slight amendment of the LDPDR.

In 2006, a strategic plan was developed for the agricultural sector, the *Plan Stratégique pour la Relance du Secteur Agricole (PSRSA) 2006–2015*. The PSRSA was developed in a month, with the Ministry of Agriculture as the sole stakeholder and producer of the policy development, which drew heavy criticism. A revised version of the strategy was rejected in 2008 by producer organizations who requested and obtained greater inclusion with the support of development partners. Over the following years, agricultural policymaking has become more inclusive in Benin, with civil society organizations taking a more active role. In 2017, a new strategy was developed – the *Plan Stratégique pour le Développement du Secteur Agricole (PSDSA) 2017–2025*. It was based on the PSRSA mid-term and final evaluations, extensive consultations, and policy-oriented evidence. The vision of the PSDSA is to improve the performance of Beninese agriculture, ensure sustainable food sovereignty, food and nutritional security, and contribute to the economic and social development of men and women to achieve the Sustainable Development Goals.

3.1.2 Energy sources: institutions, incentives, funding

Institutional rules and setup

Institutional rules and setup offer the structural foundations that shape the use (or not) of evidence in the policy cycle. In Benin, such foundations can be traced back to 2000 when the country laid out its development vision in what is known as *Vision Bénin-2025 Alafia* that highlights “good governance” as a key aspiration. The current National Development Plan (2018–2025) operationalizes this aspiration by adopting concepts such as effectiveness, efficient use of resources, transparency, and management for development results as fundamental governance principles. All these elements are indirect but marked institutional drivers for evidence use in policy (Table 3).

In February 2020, the Ministry of Planning and Development launched a methodological guide for developing policies and strategies (Ministère d’Etat Chargé du Plan et du Développement, 2020). The guide standardized the development planning process and became the reference document for developing all sectoral policies and strategies, including in the agricultural sector. In addition, the guide made provisions for evidence use at different steps. For example, it requires that for any new policy or strategy, evaluation of past policies, strategies and interventions be conducted. It also makes it compulsory to develop a monitoring and evaluation plan that clearly outlines the mechanism for evaluating a new policy or strategy. Also, some rules favour evidence generation and use at the parliament level. For instance, since 2014, the Parliament of Benin has required that the government conduct ex-ante evaluations before submitting projects and programmes that require ratification (Kouakanou *et al.*, 2020). Moreover, the creation of the Benin Parliamentary Institute (*Institut Parlementaire du Bénin*) in 2019 and the requirement that it should conduct policy research studies to support decision-making at the Parliament is a good signal.

More specifically, successive governments have taken strong steps that improve the institutional environment for evidence production and use. For example, in 2006, President Thomas Boni Yayi established the Office for Evaluation of Public Policies, transformed later into the Bureau of Evaluation of Public Policy and Analysis of Government Action (BEPPAAG)³ and a national evaluation system to support public policy evaluation. Also, less than one month after he took office in 2016, President Patrice Talon created, within the President’s Office, the Unit of Studies and Support to the Agricultural Sector (B2A). The B2A worked with the Ministry of Agriculture, Livestock and Fisheries (MAEP) and mobilized various institutions and experts to coordinate the development of agricultural policies, strategies, and programmes. Former leaders of B2A were the Minister and Chief of Staff of MAEP in 2021.

Furthermore, the institutional setup of the MAEP offers a solid foundation for evidence production and use in the policy cycle. For example, a Department of Planning coordinates the development of sectoral strategies, programming, budgeting, and monitoring of all interventions in the sector and prepares annual activity and performance reports. The Department of Agricultural Statistics collects and disseminates agricultural data to various stakeholders. The MAEP is the only ministry to have a dedicated department of statistics. The country also has a National Agricultural Research System (SNRA), an inter-institutional mechanism made of research institutions, training institutions, and non-governmental organizations (NGOs) active in agricultural research. The system is coordinated by the INRAB,

³ In 2021, the Government of Benin made the decision to restructure the Bureau and move it under the Ministry of Development.

which has a dedicated programme on agricultural policy – the Agricultural Policy Analysis Programme (PAPA).

Table 3. Institutions as energy sources for the evidence-informed policy ecosystem

| Institutions | What is it? | Since when | Who is the custodian? | How does it power the evidence-policy ecosystem? |
|----------------------------|---|--------------------------------------|--------------------------------------|---|
| Institutional rules | Vision Bénin-2025 Alafia | 2000 | President | The vision highlights “good governance” as a key aspiration |
| | National Development Plan (2018–2025) | 2018 | Ministry of Planning and Development | The plan adopts concepts such as effectiveness, efficient use of resources, transparency, and management for development results as fundamental governance principles |
| | Methodological guide for developing policies and strategies | 2020 | Ministry of Planning and Development | The guide standardizes the development planning process and makes provisions for evidence use at different steps (e.g. evaluation of past policies, strategies, and interventions prior to developing any new policy or strategy) |
| | Ratification of projects and programmes | 2014 | Parliament | Requirement for government to conduct ex-ante evaluations before submitting projects and programmes that require ratification |
| Institutional setup | Bureau Of Evaluation of Public Policy and Analysis of Government Action | 2006 | Office of the President | Supports high-quality evaluation production and use |
| | Unit of Studies and Support to the Agricultural Sector (B2A) | 2016 | Office of the President | B2A conducted most of the analyses that led to the development of agricultural policies, strategies, and programmes in effect since 2016 |
| | Department of Planning within the Ministry of Agriculture | As long as the country has had a MoA | Ministry of Agriculture | Supports programming, budgeting, and monitoring of all interventions in the sector |
| | Department of Agricultural Statistics | 2013 | Ministry of Agriculture | Collects and disseminates agricultural data |

Source: Authors’ own elaboration.

Incentives

Incentives can be grouped into two categories: incentives to produce evidence, and incentives to use it (Table 4). At the evidence production level, incentives are mainly towards researchers who are encouraged to produce evidence. The first is career advancement, which follows the rules of the African and Malagasy Council for Higher Education (CAMES). These rules consider, among other things, publications in indexed journals, the number of authors and the

relative position in the lists of authors. Lecturers who publish also receive a research bonus of 8 percent of their salary. Originally, any lecturer publishing at least one publication per year (regardless of the medium of publication) was entitled to this bonus. Following various actions by the unions, the publication requirement was changed to three years. Since 2010, it is sufficient to have one publication every three years to qualify for the bonus (Secrétariat Général du Gouvernement du Bénin, 2010).

The government provided an additional incentive in 2007 by increasing the salaries of education teachers and researchers (including INRAB). Beyond researchers, other evidence producers such as think tanks, Civil Society Organizations (CSOs) and consultancy services providers are mainly motivated by available funding or business opportunities to conduct research. However, large CSOs such as PNOPPA and PASCIB conduct research to support their advocacy campaigns. Donors also produce evidence, with the main incentive being to be able to meet reporting requirements and demonstrate the impact of their interventions or inform the design of new ones.

Regarding the other types of evidence, the incentive to produce agricultural data, for example, is mainly related to the Department of Agricultural Statistics' mandate, which is to collect data on the sector to respond to requests from policymakers and other stakeholders. FAO's technical and financial support to undertake the national agricultural census is also an important incentive. On evaluation, the main incentive is related to the institutional rules (in the methodological guide for developing policies and strategies) that require evaluating past policies and programmes before new ones are developed. Support from institutions like the International Initiative for Impact Evaluation (3ie), through its West Africa Capacity-building and Impact Evaluation (WACIE) also create incentives to conduct evaluations. The WACIE is a regional programme that aims to promote evidence-informed decision-making culture among high-level policymakers. Primary activities include capacity building in conducting impact evaluation, supporting high-quality evidence in policymaking, and supporting the government in institutionalizing evaluation.

Incentives to use evidence are mainly related to the dynamics of the policymaking process. Before 2010, the production of agricultural policy documents was the sole responsibility of the Ministry of Agriculture with minimal participation of other stakeholders, including CSOs. The main objective of these policies was to satisfy bureaucratic rules of having policy documents (in line with the planning process) and to meet development partners' agendas (Pabari *et al.*, 2020). Things started to change in 2008 when the newly established national evaluation system launched an evaluation of agricultural sector policies from 1990 to 2008. Concurrently, the PSRSA was being revised, and as in the past, the Ministry conducted the review process and submitted a new version of the strategic plan to a validation workshop. However, development partners were unconvinced by the PSRSA because stakeholders such as PNOPPA had made negative comments about it, criticizing the ministry staff for "treating other actors in the agricultural sector as their subjects" (Mongbo and Aguemon, 2015, p.2). As a result, the review process was relaunched in April 2009 with increased inclusion of other actors such as PNOPPA and lower influence of the ministry over the process. This was the starting point of an increased role of CSOs in the policymaking process.

Table 4. Incentives for producing and using evidence

| Incentives | What is it? | Since when | Who is the custodian? | How does it power the evidence-policy ecosystem? |
|-----------------------------|--|---|--|---|
| Incentive to produce | Motivation to publish research papers | 2010 | Ministry of Higher Education and Scientific Research | Research bonus of 8% of salary for one publication every three years |
| | Salary increases for higher education teachers and researchers and INRAB researchers | 2007 for higher education 2019 for INRAB | Ministry of Higher Education and Scientific Research | Retain highly qualified researchers who can conduct more research |
| | Support from FAO to conduct the national agricultural census | 2018 | FAO and the Ministry of Agriculture | Make high-quality agricultural data available |
| | Support from the International Initiative for Impact Evaluation (3ie) | 2017 | 3ie | Supports the government in institutionalizing evaluation |
| Incentives to use | New institutional framework for the agricultural sector | 2013 | Ministry of Agriculture | Reinforces the accountability system by giving more power to CSOs |
| | Accountability mechanisms and donor reporting requirements by development partners | – | Development partners | Policymakers are motivated to generate data and evidence to support the policy planning process and demonstrate impact. |
| | Support from ACED to the evidence-informed policy ecosystem | 2015 | Actions pour l'Environnement et le Développement Durable | Plays a brokering role between evidence producers and users |

Source: Authors' own elaboration.

Consequently, a new institutional framework was established and materialized in the decree 2013/47 adopted on 11 February 2013. It included the following guiding principles: participation of all actors, clear division of roles and responsibilities among key stakeholders, public-private partnerships for agricultural development, refocusing and strengthening of the state in its regulatory functions, empowerment of all actors according to their mandates and accountability. This new framework offers avenues for CSOs to play important decisive roles such as advocacy, technical inputs, and representation. Currently, two prominent CSOs are very influential in the agricultural policymaking landscape in Benin: PNOPPA and PASCIB. More recently, in July 2021, through the decree 2021/376, the network of NGOs operating in the agricultural sector (RENOVA) has been added to the institutional framework. These organizations create incentives for evidence use as they reinforce the accountability system to push policymakers to demonstrate the impact of their interventions. For example, PASCIB is a leading stakeholder in the annual performance review of the Ministry of Agriculture. Furthermore, as the leading funder of agricultural projects and programmes, development partners also create incentives for evidence use by policymakers through accountability mechanisms and donor reporting requirements. For example, at the ministerial level,

policy-makers are motivated to generate data and evidence to support the policy planning process and demonstrate the impact of interventions funded through cooperation agreements.

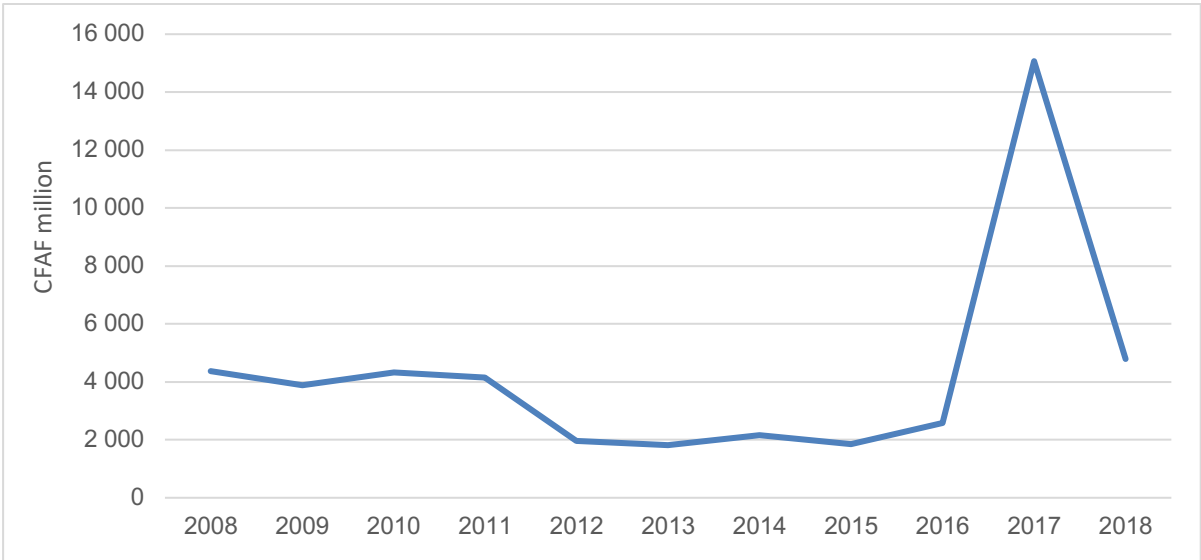
Box 1. Supporting the evidence-informed policy ecosystem, the brokering role of ACED

ACED is one of the rare locally based organizations that work at the evidence-informed policy ecosystem exclusively in the agricultural sector to create incentives for both evidence production and use. It supports evidence generators, especially researchers and data specialists, in improving the supply of quality evidence. The think tank also supports governments at both local and central levels to access, understand, and use evidence in agricultural policymaking. Finally, ACED serves as a brokering partner that bridges the gap between evidence producers and evidence users. It develops an online platform to translate agricultural research findings into accessible and relevant messages for policy-makers. It also organizes policy research dialogue to improve collaboration between evidence producers and users to formulate relevant research questions and disseminate research findings. Furthermore, ACED and 3ie/WACIE collaborate through a helpdesk to provide rapid responses to evidence requests from stakeholders in the agricultural sector. ACED is funded by external parties (vs. government funds) such as the Hewlett Foundation, the European Union and the Canadian International Development Research Centre.

Funding

Financial resources are an essential type of incentive, especially for producing different kinds of evidence. Several studies have indicated that investments in agricultural research in sub-Saharan Africa are inadequate (Adetutu and Ajayi, 2020) Benin is an example. The country invested 0.6 percent of its agricultural GDP in R&D (Domgho *et al.*, 2018) below the 1 percent minimum target recommended by the African Union and the United Nations. Almost all stakeholders interviewed mentioned that the funding level for agricultural research was insufficient. However, the situation is improving (Figure 2).

Figure 2. Public expenditure on agricultural research in Benin

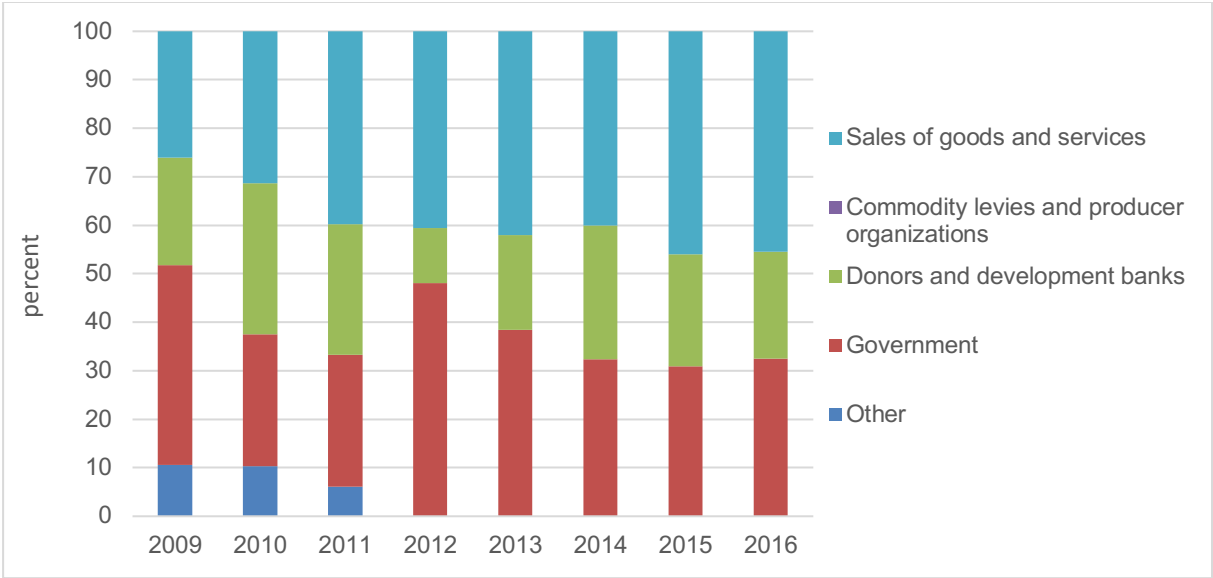


Source: Baborska, R., Cathala, P. & Vissoh, S. 2020. *Analyse des dépenses publiques en soutien à l'agriculture et l'alimentation au Bénin, 2008–2018*. FAO, Rome.

Analysis by FAO’s MAFAP programme has revealed that agricultural research and knowledge dissemination, combined, ranked second in terms of expenditures on agriculture and food from 2008 to 2018 (Baborska, Cathala and Vissoh, 2020). Over the period, different spending prioritization trends were observed. From 2011 to 2015, when the PSRSA was still in effect, priority was given to knowledge dissemination, and the amount spent on this increased steadily (+23 percent per year on average to reach CFAF 14 billion in 2015). Conversely, spending on agricultural research, and in particular on the INRAB decreased compared to the previous period (CFAF 4.2 billion francs per year on average over the 2008–2010 period) and stagnated at around 2 billion per year (Baborska, Cathala and Vissoh, 2020). With the new government, in 2016, priority was given to agricultural research. For example, in the 2017 national budget, CFAF 13 billion was allocated to agricultural research. Spending dedicated to this category more than doubled between the 2015–2016 period and the 2017–2018 period to reach an average of CFAF 10 billion, around 7.5 percent of total expenditure on food and agriculture.

Sales of goods and services account for a high share of agricultural research funding, which reflects the capacity of INRAB to generate income to support its operations. It also indicates research agencies sell goods and services on the market to make for the lack of public funding, reflecting a lower capacity of the government to shape the research agenda. Development partners play a crucial role in funding agricultural research in Benin (Figure 3).

Figure 3. Agricultural research funding by source (share of total, based on National Institute for Agricultural Research in Benin data only)



Source: ASTI. 2022. ASTI Database. In: *ASTI*. Cited 25 August 2022. www.asti.cgiar.org/data

One notable recent example is the Dutch Government, through the Dutch Research Council (NWO). From 2014 to 2020, it financed 11 applied research projects for a total of about CFAF 2 billion (around USD 3.5 million) (NWO, 2021). Projects mobilized researchers and practitioners to conduct action research that can help improve food and nutrition security. The other most significant donor-funded initiative for agricultural research is the West Africa Agricultural Productivity Program (WAAPP) funded by the World Bank. The programme supported in total 29 research and development projects, eight technology transfer projects, 106 innovation platforms between actors in the agricultural sector, and 104 masters and doctoral theses. In total, USD 9.45 million were invested from 2012 to 2016 on agricultural

research and development by the WAAPP project (CORAF, 2019). Individually, agricultural researchers from research centres or higher education also mobilize international funding, mainly through partnerships with researchers in Europe or the USA.

To sum up, a multiplicity of energy sources powers the agricultural evidence policy system in Benin. Formal institutional rules are in place for the production and use of evidence. There is also a growing practice of evidence-informed policymaking mainly pushed by the government. Incentives for evidence production by Benin researchers have been limited (salary, funding) but have improved at the turn of the 2010s.

The role of foreign sources of energy is important. Donors are incentivizing evidence production, e.g. FAO, WACIE, 3iE. Incentives for evidence use have increased with the PSRSA revision at the turn of the 2010s and the greater inclusion of CSOs (PNOPPA, PASCIB) increasing accountability. Foreign partners also incentivize use, for instance, through impact evaluation of projects. Regarding funding, investments in agricultural research are still low, although this has improved since 2016. Development partners play a critical role in funding evidence production directly to the government or civil society organizations.

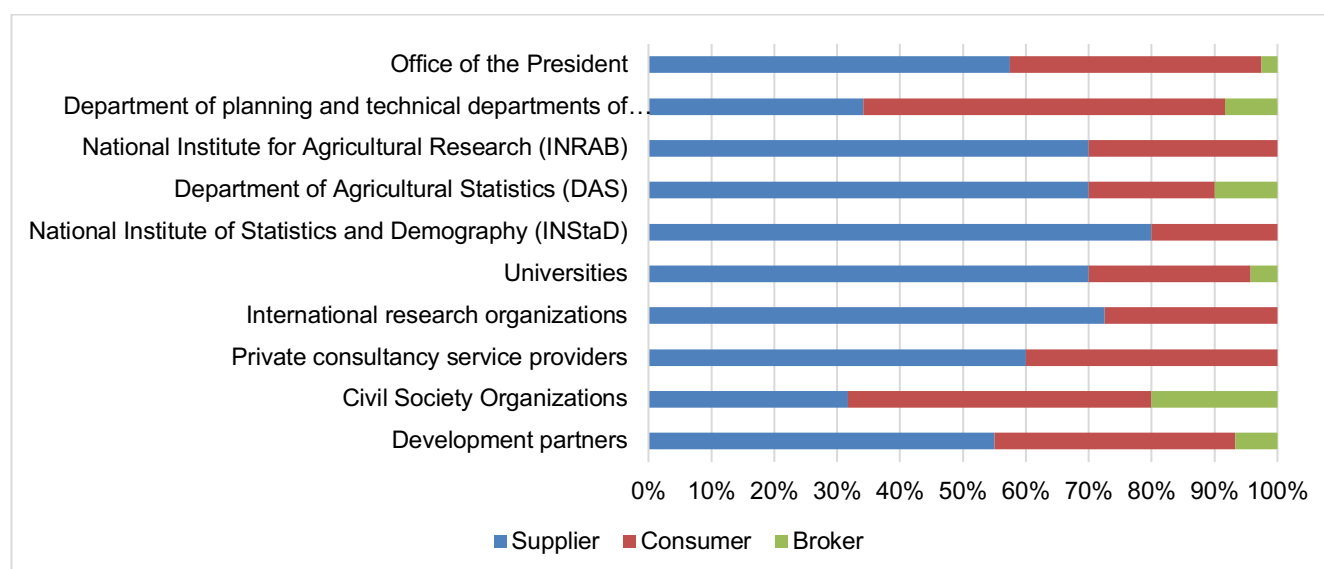
3.2 Characterizing the agricultural evidence policy system: stakeholders and evidence shared

3.2.1 Key stakeholders

The policy ecosystem is crowded by several organizations, among which the main ones are the Office of the President, the Department of Planning and technical departments of MAEP, the INRAB, the Department of Agricultural Statistics (DAS), the National Institute of Statistics and Demography (INStAD), universities, international research organizations, private consultancy service providers, CSOs and development partners. The list of organizations presented in Annex B is not exhaustive but includes the leading players, as revealed by the literature review and the mapping exercise. The reported contribution of each organization to the three stylized roles in the ecosystem (supplier, broker, consumer), as a share of 100 percent, is presented as a stacked horizontal bar chart for each stakeholder (see more details on methodology in Section 2) in Figure 4.

Beyond the Ministry of Agriculture, different organizations operate in the evidence-informed policymaking ecosystem. Most of them are both producers and consumers at varying degrees and intervene at different policy cycle stages (Table 5). All organizations are involved in policy formulation, while policy evaluation encompasses the lowest number of organizations.

Figure 4. Reported contribution of key stakeholders for the roles of supplier, consumer and broker



Source: Authors' own elaboration.

Table 5. Participation of different organizations in the policy cycle

| Organizations | Main outputs produced for the evidence ecosystem | Stage of the policy cycle |
|--|--|--|
| Office of the President | <ul style="list-style-type: none"> • Policy documents • Study reports • Evaluation reports | <ul style="list-style-type: none"> • Agenda setting • Policy formulation • Policy evaluation |
| Department of Planning of MAEP | <ul style="list-style-type: none"> • Policy documents • M&E data • Annual performance reports • Evaluation reports | <ul style="list-style-type: none"> • Agenda setting • Policy formulation • Policy implementation • Policy evaluation |
| Technical departments of MAEP | <ul style="list-style-type: none"> • Databases • Study reports • Expert knowledge | <ul style="list-style-type: none"> • Policy formulation • Policy implementation |
| National Institute for Agricultural Research | <ul style="list-style-type: none"> • Research papers • Innovations | <ul style="list-style-type: none"> • Policy formulation • Policy implementation • Policy evaluation |
| Department of Agricultural Statistics | <ul style="list-style-type: none"> • Databases • Indicators | <ul style="list-style-type: none"> • Policy formulation |
| National Institute of Statistics and Demography | <ul style="list-style-type: none"> • Databases • Economic indicators | <ul style="list-style-type: none"> • Policy formulation |
| Universities | <ul style="list-style-type: none"> • Research papers • Innovations | <ul style="list-style-type: none"> • Policy formulation • Policy implementation |
| International research organizations | <ul style="list-style-type: none"> • Research papers • Innovations | <ul style="list-style-type: none"> • Policy formulation • Policy implementation |
| Private consultancy service providers | <ul style="list-style-type: none"> • Study reports • Evaluation reports | <ul style="list-style-type: none"> • Agenda setting • Policy formulation • Policy implementation |

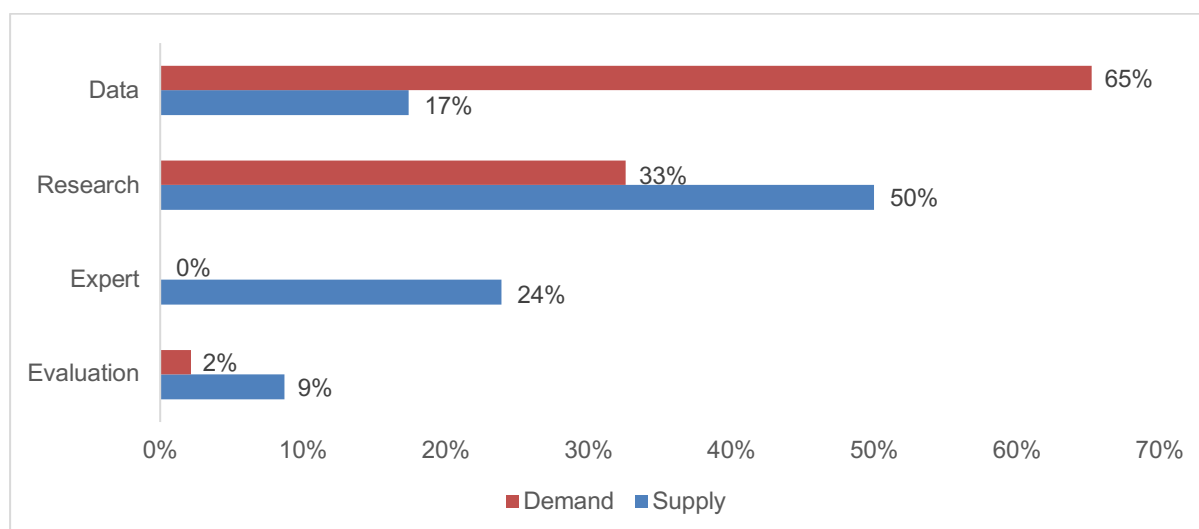
| Organizations | Main outputs produced for the evidence ecosystem | Stage of the policy cycle |
|------------------------------------|--|--|
| | | <ul style="list-style-type: none"> • Policy evaluation |
| Civil society organizations | <ul style="list-style-type: none"> • Position papers • Expert knowledge • Policy briefs | <ul style="list-style-type: none"> • Agenda setting • Policy formulation • Policy implementation |
| Development partners | <ul style="list-style-type: none"> • Study reports • M&E data • Expert knowledge | <ul style="list-style-type: none"> • Agenda setting • Policy formulation • Policy implementation • Policy evaluation |

Source: Authors' own elaboration.

3.2.2 Evidence in the ecosystem

The most common types of evidence demanded and supplied by stakeholders in the agricultural EPS are data, research, evaluation and expert knowledge (Figure 5).

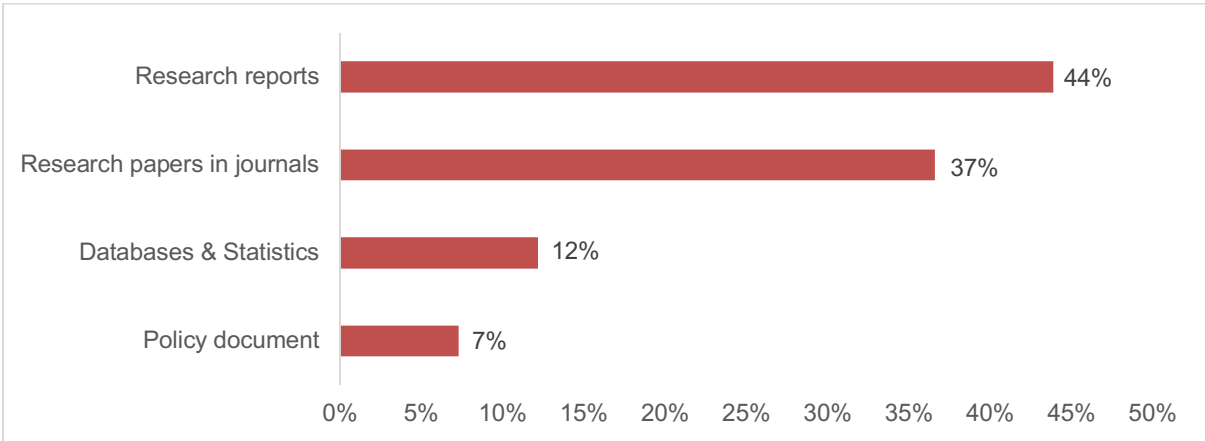
Figure 5. Preferred evidence in the evidence-policy system, supply and demand, by type of evidence (% of total respondents)



Source: Authors' own elaboration.

The demand for evidence is stronger for data and research than for evaluation and expert knowledge. The main constraints related to data are that it is scattered in the ecosystem, has quality issues and is not readily accessible to the stakeholders. On the other side, research (produced in the absence of a research agenda) is the most supplied evidence, while evaluation is the type of evidence that the ecosystem produces the least. Regarding the format in which evidence is made available, research reports dominate while policy briefs are the least used format (Figure 6).

Figure 6. Main format of evidence produced in the evidence-policy system (% of total respondents)



Source: Authors' own elaboration.

3.3 The evidence-policy system social network: trends and patterns

A central aspect of the ecosystemic approach to evidence-informed agricultural policy is to consider the interrelationships between all the organizations supplying, brokering, and consuming evidence around agriculture. To do so, the study followed the operational and methodological approach outlined in Section 2, that was underpinned by a social network analysis. The SNA entailed three major analytical dimensions: first, identifying as many organizations as possible that were part of the evidence-policy network for agriculture in Benin; second defining their ties when it comes to sharing evidence on agriculture; third analysing the network and the position of specific organizations in that network.

3.3.1 Network-level analysis

In total, 48 organizations were captured in the EPS social network. Respondents from each organization indicated how they perceived their organizations' relative contribution to the three stylized roles in the ecosystem (as a share of 100 percent): supplying, brokering, and consuming the evidence. Their net role was determined on that basis. The average reported contribution to each role, in the EPS, was of 55 percent, 37 percent and 7 percent for the roles of supplier, consumer and broker, respectively. This points to a "glut" of evidence supply in the EPS, with very limited brokerage that might have contributed to making the evidence more digestible.

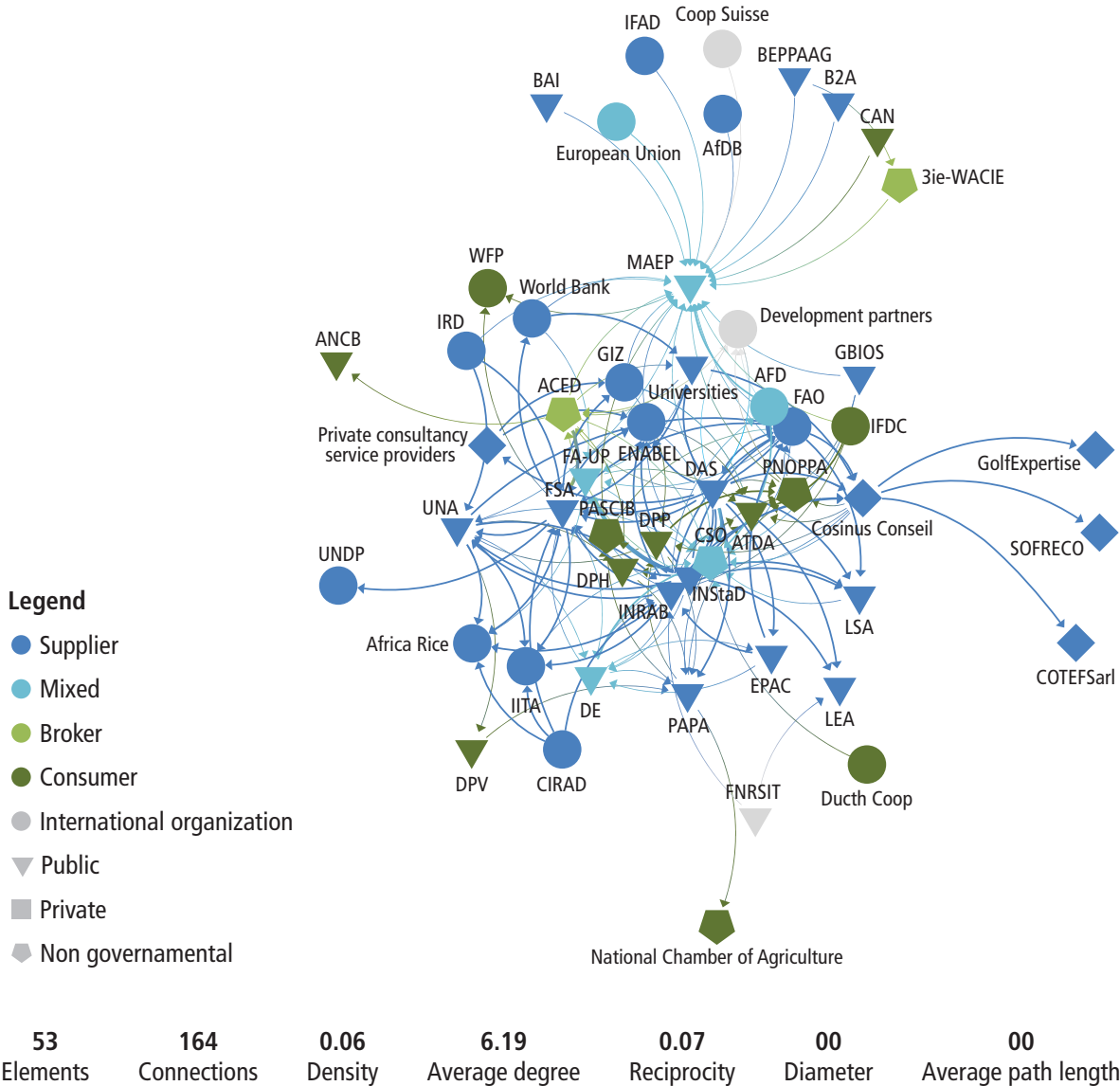
Altogether, the EPS organizations have a reported 164 connections (Figure 7). A connection was registered between two organizations when at least one of the two organizations reported that they had a relationship with the other organization consisting of supplying, consuming, brokering or co-producing evidence on agriculture. The connections have two possible directions: from organization A to organization B, or from organization B to organization A. It is possible that an organization has connections with another organization in the two directions. The type of evidence mostly shared, and the intensity of the relationship (based on frequency) were also measured.

The average number of connections across all organizations in the ecosystem is 6 and the network's density is estimated at 0.06. The network density compares the number of actual connections to the number of potential connections. Therefore, a low value indicates that the EPS is poorly connected. Organizations do not leverage much of the potential connections

they could have with other organizations, and such there may be silos in the system that undermine the circulation of evidence. The silos are clearly visible in Figure 7.

The average reported intensity of the relationship was 2.6, out of 4, indicating that the connections reported were overall substantial.

Figure 7. Evidence policy system in the agricultural sector in Benin



Note: An interactive detailed map is available at <https://embed.kumu.io/1a5ac652d77f0d875a4bd9c9f148fcda>

Source: Authors' own elaboration.

3.3.2 Node-level analysis

At the node level, the relationships in the EPS were analysed with common SNA metrics: degree centrality, closeness centrality and betweenness centrality. Degree centrality is a count of the number of connections an organization has in the network – a high degree indicates local hubs. Closeness measures the distance between each organization and all other organizations – those with high closeness can spread information to the rest of the network most easily and are in a good position to have high visibility into what is happening across the network. Betweenness centrality is a metric that captures an organization role in allowing or

blocking evidence to circulate from one section of the network to the other – organizations with high betweenness centrality can be good brokers (or not) for the network.

Hubs

In its coordinating role, the Ministry of Agriculture naturally comes out as the most central organization in the ecosystem both in terms of demand and supply of evidence (through DAS and INRAB) (Table 6). All types of evidence are used at the ministerial level to design agricultural policies and programmes and monitor the sector's performance. The ministry consumes evidence from roughly all organizations, including DAS, INStAD, INRAB, university-based research centres, international research centres, civil society organizations, development partners and private consultancy firms.

At the implementation level, it is important to notice that the territorial agencies for agricultural development are also among the top consumers of evidence in the sector. However, they mainly consume evidence produced by INRAB, university-based research centres, and development partners through the projects and programmes they implement. According to the indegree centrality metrics, CSOs are the second largest consumer of evidence after the Ministry of Agriculture (Table 6). The CSOs mainly demand data and research from statistical entities and research organizations to support their proposals and develop agricultural projects.

Highly influential organizations that supply evidence are DAS, INRAB, FSA, INStAD and Cosinus Conseil (Table 6b). Except for Cosinus Conseil, they are all public organizations, which means that government entities dominate the ecosystem in terms of supply of evidence. INStAD and DAS are important hubs for the ecosystem because of the specific nature of their activities. INStAD is the formal source of statistical data in the country, including macroeconomic indicators and aggregates of the economy's evolution or any other national activity. More specifically, DAS is the main provider of statistical information in the agricultural sector, although many informants have indicated that DAS capacity to supply evidence has been reduced over the years.

In the form of research, evidence is mainly produced by INRAB and FSA along the agricultural value chains on various topics depending on the researchers' expertise. Connections in the network show that INRAB is more oriented towards other public organizations and development partners, while university-based research institutions, such as FSA, are more open and include collaborations with other types of organizations such as CSOs. Evidence produced by university-based and INRAB researchers is mostly in the form of scientific papers published in academic journals and mainly in English. Interviews with researchers showed that their main motivations for conducting agricultural research are career advancement at CAMES (francophone Africa's higher education council) and project funding. Policy relevance and support to evidence-informed policymaking does not seem to be a high priority.

Table 6. Degree centrality – Top ten organizations

| a. Indegree (consumers) | | | b. Outdegree (suppliers) | | |
|-------------------------|--|-------|--------------------------|--|-------|
| Rank | Organization | Value | Rank | Organization | Value |
| #1 | Ministry of Agriculture, Livestock and Fisheries | 25 | #1 | Department of Agricultural Statistics | 17 |
| #2 | Civil society organizations | 13 | #2 | National Institute for Agricultural Research | 12 |
| #3 | Faculty of Agricultural Sciences | 9 | #3 | Faculty of Agricultural Sciences | 11 |
| #4 | Territorial Agency for Agricultural Development | 9 | #4 | National Institute of Statistics and Demographics | 11 |
| #5 | FAO | 8 | #5 | Cosinus Conseil | 9 |
| #6 | National Institute for Agricultural Research | 8 | #6 | National University of Agriculture | 8 |
| #7 | Enabel | 7 | #7 | FAO | 7 |
| #8 | National University of Agriculture | 6 | #8 | Department of Livestock | 6 |
| #9 | Agricultural Policy Analysis Programme | 5 | #9 | Actions pour l'Environnement et le Développement Durable | 6 |
| #10 | Department of Livestock | 5 | #10 | Agricultural Policy Analysis Programme | 5 |

Source: Authors' own elaboration.

Private consultancy services providers such as Cosinus Conseil also appear as important evidence providers. They are involved in every single stage of the policy process, from agenda-setting to evaluation. For the formulation of policies, although the MoA coordinates the process, a consultancy firm or individual consultants would be hired to lead the technical process and provide expertise. For example, they conduct diagnostic studies, ex-ante evaluation, and literature review at the beginning of the policy formulation process. Throughout the process, they provide expertise and make initial proposals discussed and approved by other stakeholders who participate in the process. They are roughly the only source of expertise to conduct technical studies for projects and programmes at the implementation phase. Consultancy service providers also dominate the evaluation landscape.

Although they did not feature in the top ten organizations for the outdegree centrality, development partners actively supply evidence. They are central in policy implementation as they fund and support the implementation of most of the country's largest agricultural projects and programmes. Doing so, they generate a considerable amount of evidence through the research and studies they conduct in their interventions and the M&E data they collect. One interview respondent indicated that development partners might have more data and evidence on specific agricultural subsectors than the government. Furthermore, one would expect to see PAPA as a hub, which is not the case. PAPA is roughly the only large agricultural policy research "organization" with less than 20 researchers. They conduct socioeconomic and policy-oriented research. However, PAPA is not well connected in the network, which may impede stakeholders to access socioeconomic and policy-oriented evidence.

In terms of evidence supply, different organizations also collaborate to co-produce evidence. For example, international and national research organizations implement joint research programmes that produce evidence mainly in the form of research papers. CSOs also

collaborate with research organizations to conduct research activities. One notable recent example is the Food and Business Research programme, a global initiative of the Netherlands Organizations for Scientific Research that supports from 2014 to 2020 joint agricultural research programmes implemented by practitioners (CSOs and private sectors) and researchers (mainly from universities). During the study, no case of evidence co-production could be mapped between government entities and researchers.

Spreaders

Spreaders are organizations that can easily share resources (evidence) with other organizations in the network – they have a high closeness centrality, which measures how close a node is to other nodes in the ecosystem. The closeness centrality indicator showed that DAS and INStAD are the top two organizations in that regard (Table 7). This can be explained by the fact that these organizations exclusively produce and share statistical data that is used as a first input in producing other types of evidence or developing a policy or strategy. For example, researchers or private consultancy service providers collect statistical data in the early stage of their research activity to inform other research process steps. Statistical data is also used in the early stages of any policy process, for example, to get information about agricultural production over the years in specific regions of the country. As such, DAS and INStAD are highly and directly connected with other organizations in the network. FSA and INRAB, as research organizations, have a similar position in the network. Other organizations can easily reach them. The FAO also appears as an organization with a high closeness centrality. As the leading United Nations specialized agency on food and agriculture, FAO is well connected to other organizations in the EPS. Its statistical database, FAOSTAT, is also an important asset that makes the organizations easily accessible to other organizations in the network.

Table 7. Closeness centrality – Top ten organizations

| Rank | Organization | Value |
|------|--|-------|
| #1 | Department of Agricultural Statistics | 0.516 |
| #2 | National Institute of Statistics and Demographics | 0.444 |
| #3 | National Institute for Agricultural Research | 0.442 |
| #4 | Faculty of Agricultural Sciences | 0.420 |
| #5 | FAO | 0.385 |
| #6 | Livestock Department | 0.374 |
| #7 | National University of Agriculture | 0.373 |
| #8 | Cosinus Conseil | 0.356 |
| #9 | Actions pour l'Environnement et le Développement Durable | 0.348 |
| #10 | Universities | 0.347 |

Source: Authors' own elaboration.

Brokers

The betweenness centrality indicator measures the share of shortest paths in the network that go through a node. It reveals which organizations have a high potential to act as bridges or brokers in the network (Table 8). The top organization is the National University of Agriculture. Although it is the most recent university in the ecosystem, it is gaining higher exposure. The main brokering role that is perceptible on the map is that UNA seems to be a central bridge between international research organizations such as Africa Rice, IITA and IRD and the technical departments of MAEP, including the departments of livestock, fisheries, and crop production.

The INRAB also has a similar potential brokering role. In addition to being the largest consumer of evidence, MAEP has a high potential to serve as a broker in the ecosystem. Because it is connected to several actors in the ecosystem, it can be an important connection point between two nodes or two groups of nodes. For example, M&E data and other types of evidence generated by development partners are shared with the department of planning of the ministry that can then be accessed by other stakeholders, including researchers or civil society organizations. Also, MAEP is the only node that connects Presidency-level organizations such as BAI, B2A and BEPPAAG to the rest of the network. It plays a similar role for many development partners.

Although these organizations are indicated as potential brokers, brokering is the less active type of relationship found in the ecosystem. Among all organizations surveyed in the ecosystem, only ACED and 3ie had indicated they were more active on brokering than any other role. These organizations are unique in that they have explicit brokering activities. For example, ACED has developed a platform that compiles research findings with actionable messages for policymakers and organizes policy research dialogues to improve the interaction between the research community and policymakers. In addition, 3ie and ACED collaborate on a helpdesk that allows policymakers to submit questions and get quick responses based on rapid evidence synthesis.

Table 8. Betweenness centrality – Top ten organizations

| Rank | Organization | Value |
|------|--|-------|
| #1 | National University of Agriculture | 0.268 |
| #2 | Ministry of Agriculture, Livestock and Fisheries | 0.239 |
| #3 | FAO | 0.124 |
| #4 | National Institute for Agricultural Research | 0.113 |
| #5 | Livestock Department | 0.082 |
| #6 | Faculty of Agricultural Sciences | 0.082 |
| #7 | Cosinus Conseil | 0.068 |
| #8 | Agricultural Policy Analysis Programme | 0.067 |
| #9 | Development partners | 0.064 |
| #10 | Enabel | 0.061 |

Source: Authors' own elaboration.

4 Assessing the sustainability of the evidence-informed policy ecosystem

4.1 Power

4.1.1 A conducive institutional framework

To be sustainable, the ecosystem should have robust and reliable sources of energy that create strong and long-lasting supply and demand for evidence. Unlike in the natural ecosystem, where the energy, such as sunlight or oxygen, is continuously produced, the energy flow in the EPS should be maintained by human-made mechanisms. Therefore, a conducive context is critical to ensure the required energy is supplied to the ecosystem.

The main source of energy that drives the ecosystem lies in its institutional rules and setup. In Benin, they can be traced back to the founding policy documents such as the Vision Bénin-2025 Alafia and the National Development Plan (2018–2025). These constitute stable foundations for promoting evidence production and use. At the operational level, the standardization of the policy planning process since 2020, through the methodological guide for developing policies and strategies, is a great advancement to foster evidence use. However, there are opportunities to improve the role that this guide is playing in the evidence-informed policy ecosystem. For example, the guide could recommend performing a thorough systematic review of “what works” while identifying the policy options. Consequently, the selection of policy options would be less based on the views of the team conducting the planning process and those of the stakeholders involved and embrace globally available evidence.

Moreover, the agricultural sector enjoys a strong institutional setup as the Ministry of Agriculture has dedicated entities that support evidence production and use (Department of Planning, Department of Agricultural Statistics and the National Institute of Agricultural Research) and can also draw from multi-sectoral organizations such as the Bureau of Evaluation of Public Policy and Analysis of Government Action, and the Unit of Studies and Support to the Agricultural Sector. This institutional setup creates a formal framework that supports individuals in developing a culture of using evidence for policymaking.

Power in the ecosystem is also strongly related to the level of demand for evidence. As shown in Table 6.a, the demand for evidence in the agricultural sector comes from various sources. In fact, almost every organization in the ecosystem demands agricultural data, which is a strong incentive for DAS and INSTaD to produce this type of evidence and for organizations such as FAO to support them in the process. Also, the accountability mechanisms and donor reporting requirements by development partners create consistent demand for using evidence.

Similarly, the institutional framework established to support the development of the agricultural sector has reinforced the accountability system by giving more power to CSOs in the policy planning process. They increase demand and use of evidence by pushing the government to mainstream the problems of agricultural actors in the policy processes and demonstrate the impact of interventions. By analysing how that institutional framework came into force, it can be argued that it is very unlikely that the sector can reverse back to the rules that prevailed before 2010 when the Ministry of Agriculture was the sole responsible for developing agricultural policy documents. There are even good signals that the institutional framework will be improved and diversified as the government included in July 2021 another CSO actor – the RENOVA network – that can further contribute to evidence production and use.

Finally, it is important to acknowledge that some of the formal institutions are conducive *de jure* (e.g. policies and strategies) and may not systematically guarantee effective evidence supply and use *de facto*. However, there are also *de facto* norms around evidence use in the policy ecosystem. For example, the strong accountability due to CSOs power and presence or the use of the methodological guide by consultancy firms to develop policies and strategies are *de facto* norms that support evidence supply and use.

4.1.2 Funding and overdependence on development partners

Investments in the ecosystem also provide an important source of energy. It is evident that funding to agricultural research is very low, 0.6 percent of agricultural GDP – below the 1 percent target of the African Union. As many of the stakeholders interviewed have stressed, funding may not be sufficient in the short or medium term. Therefore, actors in the ecosystem should leverage the presence and interest of various technical and financial partners that provide funding for agricultural research while reinforcing the national investment capacity. For example, FAO provides technical support for strategic investments such as the national agricultural census. This could be leveraged to establish the required systematic agricultural data collection system that nationally owned resources can finance. Regarding research, researchers from public and non-public institutions can mobilize external funding without any limitation. This is an opportunity to complement the resources that are made available by the government for agricultural research to keep funding the sector in producing evidence.

The overdependence on development partners for funding the ecosystem is worth noting. The CSOs that are currently important stakeholders that support demand for, and use of evidence strongly depend on it. None of them has sufficient self-generated revenues to support their operations. Among the researchers, those that are very productive highly depend on external funding for their research projects. Consequently, external funding opportunities influence the Benin agricultural research agenda, which may be harmful to the ecosystem's sustainability. Furthermore, although there are strong institutional rules in place, the system may not function well if development partners reduce funding or shift their priorities. According to a key informant from INRAB, this happened already in the past when development partners such as the Danish International Development Agency stopped supporting the national agricultural research system.⁴ As a result, the system remained inactive from 2011 to 2020, which limited the collaboration among the different stakeholders of the agricultural research system.

4.2 Resilience

In natural ecosystems, biological diversity reinforces the stability and resilience of the ecosystem as in the face of external shocks, the underperformance of some components is compensated by the other components (Loreau and de Mazancourt, 2013). As such, biologically diverse communities are more likely to be more resilient than communities that overly rely on limited number of components. The resilience of the EPS is analysed through its diversity, existing weak points, and reliability of key nodes (organizations) to maintain and reinforce the ability of the network to keep supporting evidence demand and use.

⁴ The National Agricultural Research System operated until 2011 through two programmes called “Support to Regional Agricultural Research Programs” (*Programmes régionaux de recherche agricole – APRRA*) and “Support to Agricultural Research Programs” (*Appui aux programmes de recherche agricole – APRA*).

4.3 Diversity of organization types and their activities

In general, the EPS is diverse (Figure 7). It goes beyond the Ministry of Agriculture, which mainly plays a coordinating role. Private consultancy firms, international research organizations, universities, civil society organizations, and various government entities intervene and interact in the ecosystem. Many of these organizations simultaneously play suppliers and consumers roles which is essential for the resilience of the ecosystem as it creates diversified sources of demand and use of evidence.

However, a deeper look at the ecosystem reveals some weak points. For example, agricultural research is driven by numerous hubs, including INRAB, the Faculty of Agricultural Sciences of the University of Abomey, the Faculty of Agronomy of the University of Parakou, and the National University of Agriculture. Although these hubs are diverse, the Ministry of Agriculture, as the largest consumer of agricultural research, mainly refers to INRAB. This is primarily due to the prevailing institutional framework. In fact, INRAB directly reports to the Ministry of Agriculture as one of the entities of the ministry, while universities report to the Ministry of Higher Education. There is no formal and functional mechanism for the Ministry of Agriculture to access and leverage the research produced by university entities active in agricultural research. The newly established SNRA is meant to fill the gap, but it is not yet the case from the respondent's views.

Beyond the central government, the lack of connection between the university-based research and potential users is also felt at the decentralized level. Key informants in municipalities reported that they have very limited or no relationship with researchers at universities and know little about the added value of their research. A recent report on evidence use at the decentralized level by ACED also found that local governments rarely turn to the research community to access evidence (Gbedomon, Houessou and Thoto, 2021). Consequently, the research produced at the university level is not effectively reaching government users, which is a weak point for the ecosystem. From a supply perspective, this is mainly driven by the incentives in place for university-based researchers that are more biased towards career advancement at the CAMES than contributing to societal outcomes.

Another weak point of the ecosystem is the lack of brokers and ecosystem builders. Both suppliers and consumers of evidence interviewed during the research acknowledge their limited capacity to either convey evidence to users or access evidence from producers. In such circumstances, brokers or, more broadly, ecosystem builders have an important role to play. Although the social network analysis has indicated that organizations like UNA, MAEP, FAO and INRAB can potentially play a brokering role, none has explicit brokering evidence activities. More generally, organizations that are explicitly focused on improving evidence use for decision making in the agricultural sector are quasi-inexistent. One notable exception is ACED, a think-and-do-tank that supports evidence use exclusively in the agricultural sector through brokering and ecosystem building activities. The International Initiative for Impact Evaluation through its West Africa Capacity-building and Impact Evaluation, also plays a similar role, although it is focused on evaluation and covers other sectors beyond agriculture. The brokering function in the ecosystem is crucial, so for it to be sustainable, brokering should be reinforced.

4.4 Types of evidence

Diversity in the types of evidence is another dimension of resilience as it provides the system with different kinds of evidence that can support the policy processes. The findings of this study have revealed that data and research are the dominant types of evidence in the ecosystem

and (impact) evaluation seems to be the least available. Regarding data, key limitations are the absence of a sustainable system for collecting agricultural data and challenges to access available data. For research, the available evidence is largely biased towards biophysical research over socioeconomic and policy-oriented research. As an illustration, PAPA programme of INRAB seems to be the only entity in Benin dedicated to agricultural policy research. University entities also have schools that conduct socio-economic and policy-oriented research, although their outcomes in the ecosystem are still minimal. The absence of think tanks and the fact that consultancy firms are not active in conducting self-initiated research also reduce the ecosystem's ability to produce socioeconomic and policy-oriented research. Other types of evidence, such as systematic reviews, evidence briefs and citizen evidence, are not readily available in the ecosystem and were not mentioned by stakeholders interviewed.

4.5 Resilience of the key organizations

The resilience of the ecosystem also depends on the ability of key organizations to continue to fulfil their missions. Among these organizations are the evidence producers who will need to maintain their roles despite shocks and challenges for the system to continue to function well. One such organization is INRAB. As a state organization that has been in operation since 1992, it is very unlikely that it will cease to exist as an organization. Consequently, the agricultural sector will continue to have at least one public institution dedicated to agricultural research. However, shocks may reduce its capacity to generate evidence. This was the case in the 2000s when the organization could not recruit permanent staff. INRAB was then forced to recruit temporary staff (in 2010, two-thirds of human resources were temporary). Interviews widely recognize that this situation made INRAB more fragile since the status of temporary employee does not provide as many training opportunities, nor the same possibilities for advancement, as the status of a permanent civil servant. As a result, many researchers preferred to develop their careers at the university level. Although the situation has improved in recent years and INRAB is now able (since 2019) to offer the same advantages as universities, it is important to recognize that similar shocks may keep affecting INRAB's performance and thus reduce the resilience of the ecosystem in the future.

The pattern is similar at the level of universities active in agricultural research. They are strong institutions that will continue to exist, especially since a thematic university is now functional. In terms of human resources, universities will continue to attract qualified researchers who can contribute to the ecosystem with quality evidence. However, the issue of research funding could be a handicap for these organizations due to the volatility of priorities and funding from development partners. This weakness is also valid for civil society organizations, which are currently guarantors of the use of evidence through accountability mechanisms but whose position could be weakened if development partners' support were to decrease.

Regarding the Ministry of Agriculture, its function as an evidence user is resilient to the various reforms and adjustments in the sector. As the main coordinating institution for the agricultural sector, the Ministry will continue to maintain a demand for evidence. As an illustration, despite the profound reforms between the governments of Yayi Boni (2006–2016) and Patrice Talon (since 2016), the demand for and use of evidence has not changed. However, in terms of its capacity to produce evidence, policy reforms could affect the ministry. For example, during interviews, officials from DAS, the ministry's main producer of evidence, raised the fact that recent reforms have reduced their capacity to collect data in the sector particularly because of the reduction in their human resources.

4.6 Capability

The stakeholders interviewed reported various capacity gaps regarding evidence production, use and brokering. At the production level, capacity gaps were mostly identified among human resources and infrastructural assets. For example, stakeholders from DAS mentioned that they do not have sufficient human resources, especially at the decentralized level, to support field activities. There are capacity gaps among the available staff related to using innovative data collection and analysis tools (drones and AI, for example) and handling advanced data management (big data, for example). Researchers of INRAB and universities mainly mention the lack of modern laboratories to conduct experiments, lack of access to subscription-based journals, and expertise in advanced policy analysis. Some researchers also mentioned they would need capacity building to formulate research questions that are more relevant to policymaking and communicate about their research, for example, through policy briefs. The private consultancy service providers mention capacity gaps related to incorporating research findings into their work. For example, access to subscription-based journals and research papers (mostly in scientific jargon and in English) is a major challenge. Consultancy service providers also raised capacity needs on complex data analysis and policy forecasting.

On evidence use, policymakers mainly stressed the need to improve their capacities to formulate evidence requests, access evidence repositories, and understand and extract the evidence. As the policymaker is not a "researcher", these capacity needs raise the question of the language and mechanisms in place to move evidence from production to use. In the current setup, it is not easy for policymakers to access research results because of the lack of a central repository of research results and because the language is not appropriate. Consequently, some policymakers have raised the need to have an "evidence unit" that would support them in addressing their evidence needs in the policy cycle. Regarding the brokering level, the lack of organizations specialized in evidence brokering mainly explains the capacity gap in the ecosystem. Currently, it is expected that the researchers should also communicate their findings to the policymakers or that the latter should proactively seek evidence from the producers. This does not happen often and should be facilitated by the brokers. Among the few organizations that have some brokering activity, they mentioned the need to have better capacities in innovative approaches for supporting evidence brokering, for example, by developing other evidence materials and services beyond policy briefs such as animated videos, podcasts, and evidence dialogues.

Overall, the actors also raised the lack of qualified human resources, notably for two reasons. First, retirements are not covered timely by new recruitments. As a result, qualified researchers are retiring at INRAB and in universities without younger researchers being prepared to take over. Secondly, many young, qualified researchers are recruited by international organizations or universities and no longer contribute to scientific production in the country. At the level of evidence users, namely policymakers, in addition to the issue of retirements and brain drain, staff turnover is another challenge and does not favour a strong culture of evidence production and use.

Furthermore, capacity gaps are also visible at the local governments level that seem to be disconnected from the evidence policy system. As Figure 7 shows, local governments (represented by ANCB) seem disconnected from the ecosystem and are on the periphery. Yet, the decentralization that began in the 2000s also included the decentralization of policy formulation and implementation to the local level. As such communal development plans are drawn up to guide the development process. However, in practice, there are points of conflict

and overlaps between the central and local levels. Municipalities do not have the capacity to ensure the continuous production of and access to evidence in the different sectors, even less in the agricultural sector. The concentration of evidence producers, such as universities, in only a few cities, means that research data needs at the local level are not being met. Municipalities are therefore limited to administrative data and what they can collect from the deconcentrated institutions of the Ministry of Agriculture. As a result, data from citizen consultations are still highly important for policy formulation and implementation. In conclusion, as shown earlier, the ecosystem can produce and use evidence for policymaking. However, there are still capacity gaps that can be addressed to further improve its functioning and sustainability.

5 Opportunities for improving the evidence-informed policy ecosystem: key insights and recommendations

This study analysed the ecosystem that supports production and use of evidence for policymaking in the agricultural sector in Benin. This section draws from the study's key insights to make policy recommendations on how to increase the ecosystem's sustainability and performance.

5.1 To the Government of Benin

Develop a strategic vision for agricultural research. The absence of a strong strategic vision that puts research at the centre of decision making and development in the agricultural sector could explain many of the challenges encountered in the ecosystem. The definition of this strategic vision should start with a diagnosis and a thorough review of the (potential) contribution of research to agricultural development and food security. This will demonstrate the impact of research on the sector and better motivate the various actors, especially policymakers, to refocus the production and use of evidence in the policy process. Such a strategic vision is useful for initiating the necessary reforms that will make it possible to put evidence more at the service of agricultural sector development.

The PSDSA, having defined the country's broad ambitions for the agricultural sector, would be a good starting point for formulating this vision. Then a research agenda can be developed to align evidence generation with the needs and aspirations of the sector. The creation of the Cotton Research Institute is an example of formulating and pursuing a vision for research in line with the country's agricultural ambitions.

5.2 To the researchers (and the government)

Put the researcher at the service of agricultural development. In the evidence ecosystem in the agricultural sector in Benin, the public researcher is a central piece. However, the study found that researchers' key incentives are career advancement at CAMES and mobilization of funds for projects. Although important as motivations, these two elements could be counterproductive if not well managed, as they may take precedence over the end goal of contributing to the development of the Benin agricultural sector. To strengthen the researcher's contribution to policy and agricultural sector development in general, this objective could be more explicitly defined and put at the core of the agricultural research incentive system, for instance, through relevant performance indicators and career incentives tied to direct contribution of the research to agricultural development.

Other actions could also be taken in connection with the definition of a strategic vision for agricultural research. One of them is to promote more collective and collaborative research, including between universities, government bodies and private sector. The merging of research laboratories within universities is a bold step in this direction. Another action is the reinforcement of the SNRA, which may allow all actors to work towards a common vision and may remobilize researchers to increase their contribution to the ecosystem.

Invest in impact evaluation. Although impact evaluation is an important source of evidence for policymaking in any development sector, including the agricultural sector, it is the least produced and used evidence type in the ecosystem. To increase the production and use of impact evaluation, investments should be made to improve the human resources and allocate more resources to policies and programmes to conduct impact evaluation. A strategic

partnership between the Ministry of Agriculture and the Department of Evaluation and Social Change Observatory (former Bureau of Evaluation) could be relevant and useful. The ministry will provide content and opportunities for impact evaluation, and the Department will provide expertise as it did for the evaluation of agricultural policies in 2008.

5.3 To the Department of Agricultural Statistics

Strengthen the agricultural data system. Agricultural data is the most in demand evidence type in the ecosystem. Therefore, the ecosystem will not function well if its capacity to generate and use data is not optimal. Although there have been efforts to improve the national agricultural data system, there are opportunities to improve its performance. First, DAS should be reinforced institutionally and financially to develop a systematic data collection mechanism that moves from *ad hoc* to periodic data collection based on the data needs of the ecosystem to make decisions and develop policies and programmes. Another important action is harmonizing agricultural data collection activities at the country level. Currently, DAS is not a central point to access all the agricultural data that is collected in the country. The ecosystem would benefit a lot from increased harmonization and consolidation. The *visa statistique* could be leveraged to identify all agricultural data collection activities and track and collect their outputs. DAS would then develop its capacities to consolidate and make data accessible to the ecosystem.

Improve access to evidence. One significant bottleneck in the ecosystem that stakeholders stressed is poor access to evidence, mainly data and research. A major step forward would be developing a publicly accessible national platform that displays agricultural data up to the standard of international platforms such as the FAOSTAT database or the World Development Indicators. Such a platform⁵ should give access to raw data that is updated and disaggregated. The national agricultural census could offer a good basis for such a platform that can be later updated once the harmonization of agricultural data collection activities has been advanced. Regarding research, a relevant action would be to invest in think tanks that can translate research findings into accessible languages for policymakers.

5.4 To the donors (and the government)

Leverage the positioning of the CSOs in the institutional architecture. Civil society organizations, like PASCIB and PNOPPA, are strongly represented and consulted in the decision-making process in the agricultural sector in Benin. They can strategically play a brokering role or foster demand for evidence from policymakers. The CSOs need evidence to either demonstrate the magnitude of the policy problems they are raising or support the policy options they are proposing to contribute to the policy processes. On the other hand, evidence producers, like research organizations, can leverage the positioning of the CSOs and their ability to broker relationships to share their findings. This may be a mutually beneficial relationship. However, for this to be sustainable, it is important to reduce the overdependence of CSOs on donors to keep their current strategic positioning even when funding from donors is no longer available.

The same strategy can also be used with private consultancy service providers as they are a large producer of evidence for decision-makers. Researchers and the evidence ecosystem builders can strategically collaborate with them to build the culture and the capacity to use

⁵ In early 2022, the Department of Agricultural Statistics has released <https://dsa.agriculture.gouv.bj/> that will gradually be positioned as the platform for agricultural statistics in Benin.

evidence in their work. One concrete action could be to develop guides, for example, on how to conduct impact evaluation or systematic reviews that consultancy service providers will be forced to use, as is the case for the methodological guide for developing policies and strategies.

Build capacities. This study has identified key points in terms of capacity gaps in the ecosystem, but it would be relevant to conduct a more in-depth diagnosis of capacity needs. Consequently, a capacity development strategy would be designed and will cover the production, use and brokering dimensions of the evidence ecosystem. Such a strategy should address the capacity gaps at human resources and infrastructural levels and start with the most central organizations in the ecosystem. In addition, partnerships with technical and financial partners interested in supporting evidence production and use (e.g. FAO) could be leveraged.

Institutionalize evidence use. The ecosystem will not improve much if evidence production and use do not become institutionalized and systematic. For this to happen, the starting point would be to improve understanding of the agricultural policymaking landscape. It would help identify the opportunities to further leverage the existing institutional rules and setup and create the necessary incentives so that stakeholders produce and use evidence not just because they want but because the system has created the conditions required to force action. One specific action to support the institutionalization of evidence use would be to support the emergence of think tanks such as PAPA and ACED that can conduct socio-economic and policy-related research and play a helpdesk role to increase access to evidence. At the institutional level, it would also be vital to avoid policy reforms that reduce the capabilities of organizations to produce or use evidence, as was the case with the decrease in human resources funding of DAS.

6 Conclusion

The objective of the study was to apply a new conceptual framework to analyse the evidence-policy system in the agricultural sector in Benin. To do so, a multi-faceted approach to collect and analyse data about the context, the stakeholders, evidence, and the sustainability of the ecosystem was used. In conclusion, the institutional rules and setup, the incentives in place and the funding landscape create a conducive environment in which organizations foster demand and production of evidence in the agricultural sector in Benin. However, as discussed in this study, the sustainability of the ecosystem is threatened by various elements related to how it is powered, resilient and capable.

In Benin, it is recommended that the government develops and implements a strategic vision for agricultural research. This vision should identify funding sources from a variety of sources and create an incentive framework to researchers to produce policy-relevant evidence, for instance through remuneration related to performance in that domain. It is also critical for the government and donors to strengthen the agricultural data system by funding and encouraging systematic and harmonized agricultural data collection mechanisms, including by reinforcing the Department of Agricultural Statistics, making data and research more open, accessible, and intelligible to all policy stakeholders, including at the decentralized level. Finally, the government and donors should strive to institutionalize the demand for evidence, through formal rules that require its use (e.g. impact evaluations for every project) and by supporting CSOs that enhance government accountability for evidence-based policy. Government and partners should also encourage supply of evidence, by providing greater funding to think tanks and organizations that produce policy-related research and strengthening capacities for policy-relevant evidence production in government organizations.

However, it is essential to acknowledge that *evidence* is not the only ingredient of decision making and policymaking in the agricultural development sector. Other factors such as political interests, the world views of policymakers, or financial constraints also play an important role. While these factors are often studied and analysed, there is a paradoxical lack of evidence on how evidence is being generated, circulated, and used in agricultural policy. This study has contributed to give a better understanding of the place evidence occupies in the agricultural policymaking sphere.

Moreover, it is important to acknowledge that the policy landscape is highly dynamic, while the EPS analysis is a snapshot reflecting a static time period. During the time of this study, from data collection to reporting, different policy changes have affected the ecosystem. Therefore, it is important to focus EPS analysis on the strategic level, to ensure that subsequent recommendations can remain valid for a longer period and can be implemented.

The ecosystemic perspective of the study offers an interesting view and opportunity to analyse how evidence is produced and used and increase its contribution to the larger policymaking landscape. The conceptual framework proposed has been applied in Benin and will then be extended to Ethiopia using the same data collection and analysis tools. Although it indicates there is potential to replicate the study across geographies, more empirical analysis is needed to continue refining the framework. Furthermore, the initial ambition was that the application of the framework should be feasible with limited resources and within a short time span of around six months. In practice, the study in Benin and Ethiopia had mobilized one expert per country with the support of an FAO staff and was completed in less than six months. Therefore, it can be concluded that rapid and cost-effective analysis can be generated from the framework.

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Annex A. List of variables used in the questionnaire

Table A1. List of variables used in the questionnaire

| Variable | Description / question | Values |
|---|---|---|
| Name of the organization | | |
| Geographical coverage | Geographical coverage by mandate | <ul style="list-style-type: none"> • National • Sub-national • Local |
| Date of creation (year) | Date of formal creation of the organization | • |
| Formal status | | <ul style="list-style-type: none"> • Public • Parastatal • Private • Non-governmental • International |
| Policy stages | Policy stages at which the organization mostly intervene (relative importance of each on the 100 percent-scale – the total should be 100 percent) | <ul style="list-style-type: none"> • Agenda setting and policy prioritization • Policy formulation (strategies) • Policy implementation (project/programme) • Evaluation |
| Roles | On a 100 percent-scale, how would you rate your participation in each of the following roles within the EPS? | <ul style="list-style-type: none"> • Supplier – Production of evidence • Consumer – (demand) and use of evidence • Broker – Intermediary and brokering role between evidence suppliers and users |
| Role “supplier” / type of evidence | What are the different types of evidence you produce in order of predominance? | <ul style="list-style-type: none"> • Statistics • Databases • Research findings • Evaluation • Expert knowledge |
| Role “supplier” / motivation | Why did you decide to produce the evidence? | <ul style="list-style-type: none"> • Own initiative • Demand-driven • Project funding |
| Role “supplier” / format | In which format(s) do you produce the evidence? | <ul style="list-style-type: none"> • Research report • Scientific paper in a journal • Policy brief • Technical notes |
| Role “consumer” / type of evidence | What are the different types of evidence you use, in order of predominance? | <ul style="list-style-type: none"> • Statistics • Databases • Research findings • Evaluation • Expert knowledge |
| Role “consumer” / access | How do you access the evidence? | |

| Variable | Description / question | Values |
|--|---|---|
| Role “consumer” / format adequacy | Is the format of the evidence appropriate for your needs? | <ul style="list-style-type: none"> • Yes • No |
| Role “broker” / type of evidence | For what types of evidence do you act as a broker? | <ul style="list-style-type: none"> • Statistics • Databases • Research findings • Evaluation • Expert knowledge |
| Role “broker” / access | How do you access the evidence? | |
| Role “broker” / method | How do you play this brokering role? | <ul style="list-style-type: none"> • Digital platform • Physical library • Provision of access codes to international databases • Conferences • Workshops for sharing research results |

Source: Authors' own elaboration.

Annex B. Description of the main organizations in the ecosystem

Office of the President

Different institutions operate at the highest level of the government and influence evidence production and use in various development sectors, including the agricultural sector. The Bureau d'Analyse et d'Investigation (BAI) is a competence hub of the Presidency of the Republic whose primary mission is to support the implementation and monitoring of the government action plan, a list of 45 priority projects and 130 reforms that guide the interventions of the government.⁶ Among other tasks, the BAI helps designing projects and performs quality reviews of government reforms, it also informs decision-making with evidence. The B21 was established in 2016 to coordinate the design of agricultural development programmes included in the government action plan. The unit is currently less active than it used to be, possibly because it had completed its mission of setting the country's agricultural development agenda. The B2A key staff is now at the ministry of agriculture – the Minister and Chief of Staff, as of 2021, were former key members of B2A. Another unit is the BEPPAAG, which coordinates the national evaluation systems. The role of BEPPAAG is to support the evaluation of public policies and ensure the monitoring of public action through the development of a management performance tracking system for the public sector. In 2008–2009, the Bureau conducted the evaluation of agricultural policies. The results and recommendations provided evidence that supports the design of effective agricultural policies that are still in force to date (Kouakanou *et al.*, 2020). In 2021, the government made the decision to restructure the Bureau and move it under the Ministry of Development. Finally, the National Food and Nutrition Council (CAN) is another relevant unit under the Office. Its role is to coordinate interventions in the food and nutrition security sector and formulate recommendations for developing national approaches to ensure food and nutrition security that can be integrated into national policies and programmes.

Ministry of Agriculture, Livestock and Fisheries

The MAEP is the custodian of agricultural development in Benin. It designs and coordinates the implementation of agricultural policies, strategies and programmes. Key institutions are mobilized to embed evidence production and use in the policy cycle.

Department of Planning and technical departments of MAEP

The Department of Planning⁷ oversees strategic thinking and coordinates planning, monitoring and evaluating interventions in the agricultural sector. For instance, it is in relation with all projects and programmes funded or implemented by development partners. The department is a hub of agricultural data and evidence and has a broader view of the sector. The department is also in charge of preparing the budget of the ministry and the annual performance report. Mid-term and final evaluations of the PSRSA were carried out internally by MAEP in 2014 and 2016, with DPP playing a central role. Such positioning makes it an important stakeholder of the evidence production and use ecosystem. The technical departments of the Ministry of Agriculture are also involved in evidence production and use. The central technical departments are focused on crop production, livestock and fisheries. In their specific

⁶ A review of the implementation of the action plan is available at <https://beninrevele.bj/wp-content/uploads/2021/03/Synthese-generale-1.pdf>

⁷ At the time of data collection for this study in 2021, the department of planning was still active. However, in early 2022, it merged with the financial department of the Ministry of Agriculture to create a new department named Department of Planning, Administration and Finance (DPAF).

subsectors, they collect data, conduct studies, and provide expert knowledge to other government entities or non-state actors.

National Institute for Agricultural Research

The INRAB is Benin's most important agricultural research organization. It has undergone major reforms in recent years, culminating in the adoption of new statutes in July 2019 to improve the institute's performance. Key among the reforms is the application of the special status of lecturers and researchers of higher education to the researchers of INRAB. Until recently, researchers of INRAB were classified as "ordinary" public servants, unlike their university-based colleagues who enjoy a special status that has significant implications on their salaries and benefits. As a result, INRAB can now mobilize highly qualified staff who will not leave for university-based jobs as it was the case in the past. In addition, INRAB coordinates the National Agricultural Research System. In 2017, it led the development of a national agricultural research plan (2018–2025), which is not yet used as a reference document to coordinate agricultural research in the country, according to many of the researchers interviewed. Research activities of INRAB are carried out mainly in the form of sectoral and regional programmes focused on crops, livestock, post-harvest, socio-economic issues, forestry, agricultural engineering and natural resources. Most of the research programmes of INRAB are on agricultural technologies, especially on crop production.

Department of Agricultural Statistics

Within the Ministry of Agriculture, DAS coordinates data collection activities throughout the different agricultural value chains. The main data collected cover agricultural production, land, inputs and prices. The DAS produces data in the form of statistics, databases, indices and develops periodic data briefs and technical notes. Data on exports of agricultural products, especially through the port, are collected by the National Institute of Statistics and Demography. The DAS is central to the National Agricultural Census supported by FAO. The census is a large-scale statistical operation covering the entire country, which consists of collecting, processing, and disseminating quantitative and qualitative structural data on the agricultural sector. It covers the subsectors of crop production, animal production, fisheries and aquaculture, processing and marketing of agricultural products. The census provides reliable data relevant to the planning, evaluation and impact measurement of agricultural development projects and programmes and will enable regular food security analysis and management. Moreover, in 2020, the government has established the National Integrated System of Agricultural and Food Statistics to strengthen the coordination of agricultural statistics production activities to better report on the effects of reforms in the agricultural sector.

National Institute of Statistics and Demography

The INStAD is the country's largest evidence producer. Its main task is to collect, process, analyse, and present reliable and scientifically elaborated statistics to the government, including macroeconomic indicators and aggregates of the economy's evolution or any other national activity. It collaborates with the Ministry of Agriculture, especially the Department of Planning and the Department of Agricultural Statistics, to collect and present agricultural statistics. In addition, INStAD coordinates the National Council of Statistics, whose prior authorization is required to conduct any data collection or research activity in Benin.

Universities

The higher education sector is increasingly playing an important role in agricultural research. Different units under the University of Abomey-Calavi are active in conducting agricultural

research activities, the largest of which is the Faculty of Agricultural Sciences. In the northern part of the country, the Faculty of Agronomy of the University of Parakou is also very active in agricultural research. Since 2013, the country has had a National University of Agriculture that is gradually taking shape and importance in the agricultural research landscape.

International research organizations

Various international research organizations operate in Benin. They mainly include foreign national research organizations such as CIRAD and IRD from France, CGIAR centres like Africa Rice Centre, International Institute of Tropical Agriculture, The Alliance of Bioversity International and the International Centre for Tropical Agriculture and other international non-profit research organizations like the World Vegetable Centre.

Private consultancy service providers

They include individual consultants, local consultancy firms, and international consultancy firms. A common characteristic of these stakeholders is that they are for-profit and generate evidence exclusively on-demand. Except for research organizations with internal capacities to conduct research and studies, they provide research services to all other stakeholders of the evidence ecosystem.

Civil society organizations

They are diverse and play various roles in the evidence-informed policy ecosystem. The most prominent CSOs are the National Platform of Agricultural Farmer and Producer Organizations and the Platform of Civil Society Stakeholders in Benin. They intervene at the highest level of agricultural policymaking and policy implementation in Benin. The institutional architecture of agricultural development in Benin made provision for them to be involved in agenda-setting and policy formulation and be members of the steering and monitoring committees of government-led agricultural projects and programmes. They contribute with “citizen evidence” to ensure policies respond to the needs of agricultural stakeholders and generate impact. They also generate evidence by conducting research to better understand the existing challenges and problems and support their proposals. Another large group of CSOs are NGOs that specialize in the agricultural sector. They play different roles in the evidence ecosystem. They are less active in agenda-setting and policy formulation, although some NGOs are invited to participate in some technical committees for policy formulation to contribute their field expertise.

Development partners

Multilateral agencies (such as the European Union, the World Bank, the African Development Bank and the International Fund for Agricultural Development), bilateral agencies (such as the *Agence Française de Développement*, the *Deutsche Gesellschaft für Internationale Zusammenarbeit*, the Dutch cooperation, USAID, Enabel and the Swiss Development Cooperation) and various United Nations agencies play a key role in agricultural policymaking and evidence generation and use. This happens through different means. For example, evidence is generated by the monitoring and evaluation systems put in place to comply with reporting requirements of projects and programmes funded by development partners. They also conduct studies to inform their funding decisions and projects and programmes design. Furthermore, development partners influence evidence production and use by providing technical assistance (e.g. MAFAP) or supporting specific evidence-related activities (e.g. the National Agricultural Census by FAO and the Comprehensive Food Security and Vulnerability Analysis by the World Food Programme).

On the other hand, development partners influence the evidence-policy system by providing support to non-state actors so that they take a more active role in the ecosystem. One notable example in Benin is the support of donors to PNOPPA that has transformed the producers' union from a minor stakeholder until 2008 to a leading actor in high-level agricultural policymaking processes (Kouakanou *et al.*, 2020). Another example is the Food and Business Research programme developed by the Dutch Research Council that provides funding and technical support to researchers and practitioners for joint projects.

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