PIM SYNTHESIS BRIEF

RESEARCH PROGRAM ON Policies, Institutions, and Markets

CGIAR

Led by IFPRI

AGRICULTURAL EXTENSION AND RURAL ADVISORY SERVICES: WHAT HAVE WE LEARNED? WHAT'S NEXT?

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4 November 2021

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Introduction

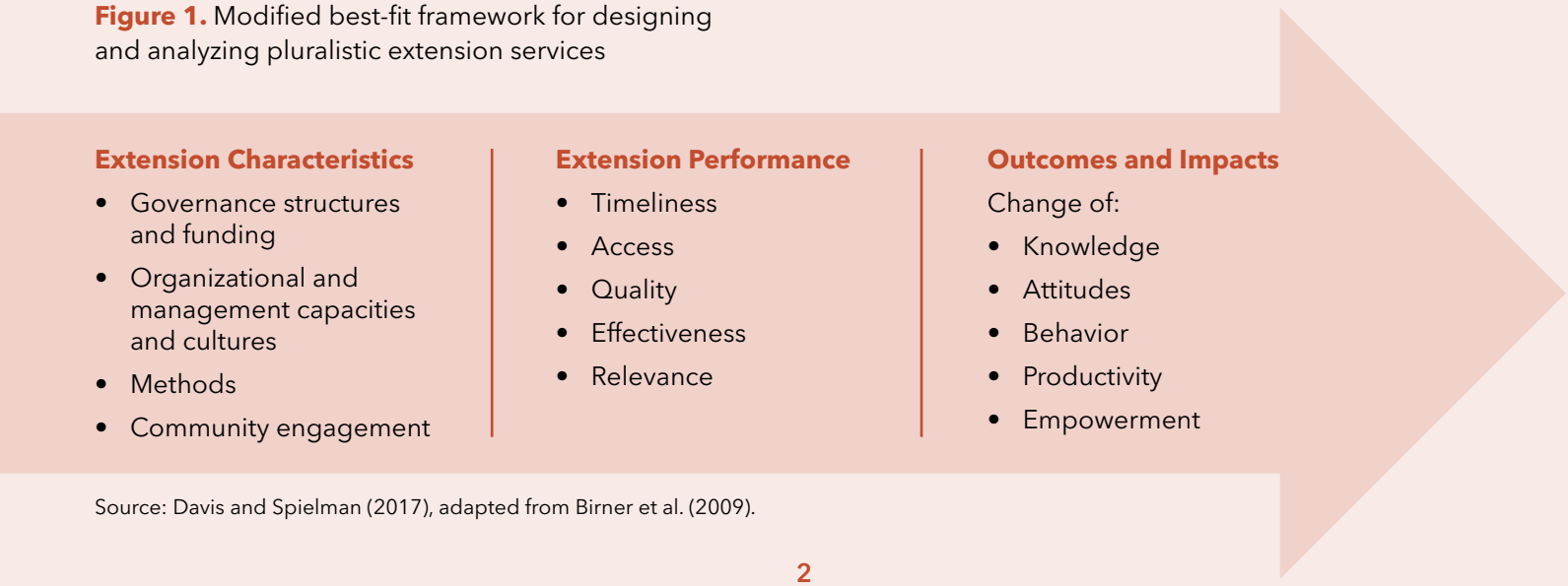
Agricultural extension provides the critical connection from agricultural innovation and discovery to durable improvements at scale, as farmers and other actors in the rural economy learn, adapt, and innovate with new technologies and practices. However, lack of capacity and performance of agricultural extension in lower- and middle-income countries is an ongoing concern. Research on agricultural extension and advisory services (in short, extension) has been an integral part of the CGIAR Research Program on Policies, Institutions, and Markets (PIM) since its inception. This brief synthesizes key findings from research funded by and linked to PIM from 2012 to 2021, presenting lessons learned and a vision for the future of extension. A list of all PIM-related extension and advisory services research is provided at the end.

Designing and implementing effective provision of extension is complex, and efforts to strengthen extension services often fall into a trap of adopting "best practice" blueprint approaches that are not well-tailored to local conditions. An expansive literature examines the promises and pitfalls of common approaches, including training-and-visit extension systems, farmer field schools, and many others (Anderson and Feder 2004; Anderson et al. 2006; Waddington and White 2014; Scoones and Thompson 2009). To understand extension systems and build evidence for what works and where, the "best-fit" framework, a widely recognized approach developed by Birner and colleagues (2009) and adapted by Davis and Spielman (2017), offers a simple impact chain approach (Figure 1). The framework focuses on a defined set of extension service characteristics that affect performance: governance structures and funding; organizational and management capacities and cultures; methods; and community engagement – all of which are subject to external factors such as the policy environment, agroecological conditions, and farming-system heterogeneity. To enhance extension performance and, ultimately, a wide range of outcomes and impacts, new and innovative interventions can be applied and adapted within this set of extension characteristics.

Governance structures and funding

Research on extension governance describes the institutional options for structuring, organizing, and financing the provision of services to farmers and other end-users and evaluates their impacts (Birner et al. 2009). Experiments with shifting governance of extension services from the national level to more local levels have shown mixed impacts. **Decentralization** involves transferring decision-making to local levels, enhancing public participation, and expanding local government involvement (Rivera and Alex 2004). In Ethiopia, Kosec and Mogues (2020) found that decentralization improved access to extension, as well as other agricultural services, for both men and women. However, men saw a greater improvement in access than women did, meaning that decentralization increased the gender gap in access. In Ghana, Resnick (2021) found that the **devolution**

Figure 1. Modified best-fit framework for designing and analyzing pluralistic extension services



Source: Davis and Spielman (2017), adapted from Birner et al. (2009).

of extension – the transfer of planning, management, and co-financing to local authorities (Rivera and Alex 2004) – also had both positive and negative effects. Specifically, devolution enhanced accountability of the local extension services but undermined their provision. Local government median agricultural expenditures fell by 36 percent in the five years following devolution – a decline only partly attributable to an overall reduction in the resources allocated to local authorities.

Initiatives to make extension more demand-driven, **inclusive**, and accountable comprise another set of governance reforms. For example, in China, an inclusive extension system piloted in 2005 targeted all farmers, better identified their needs, and implemented a system of accountability. This inclusive system was shown to have significantly improved farmers' access to services and adoption of new technologies (Hu et al. 2012).

The reach of extension can also be extended by reforms to increase space for **pluralistic** service provision. Pluralistic extension structures expand beyond traditional provision by agricultural ministries and their agencies to include nongovernmental organizations and the private sector (Davis and Alex 2020). In Uganda, for example, a study examined a private sector model in which "village-level agents" serve as produce aggregators, providing a link between farmers and companies that buy the produce and provide inputs (Scheer and Okelai 2019). Several projects in Uganda started building on this model by providing agents with additional skills training and information so they could serve as local extension advisors, potentially on a fee-for-service basis. The initial pilot results were encouraging enough that the Government of Uganda began a scale-up effort designed to enhance the reach of its own public extension service, with the goal of training some 32,000 village agents (Scheer and Okelai 2019). By the start of the COVID-19 pandemic in 2020, the government had trained about 8,000 agents, according to a government source.

Institutionalization and sustainability of approaches that promote local village agent, volunteer, contact, or lead farmer approaches is of concern; what happens once there is no support from a project funded by donors or the government? Kiptot and Franzel (2019) examined experiences of dairy producer organizations that continued their volunteer trainer program after project funding ended. They found that sustainability was driven by local institutional support, social capital, technical backstopping, and personal motivation of farmer trainers to work as volunteers. In addition, strong organizations and an informal multi-institutional network that supported learning processes were also crucial.

In 2015, Zhou and Babu provided global lessons on **private-sector** extension by editing a series of case studies of private-sector extension provision. The cases examined value chains formed around various commodities, where most companies used a contractual arrangement with the farmer producers. Some selected broad lessons from these cases follow. First, the private companies provided integrated services, giving farmers with all-round support. Second, contracted farmers were assured of markets for their produce, removing uncertainties and guaranteeing prices. Third, companies were responsive to farmer demand. Finally, the companies helped to strengthen the capacities of the producers to meet quality requirements (Zhou and Babu 2015).

Reforming extension financing is a perennial challenge. Between 2015 and 2018, less than 3 percent of global development finance was spent on human capital investment in the form of agricultural training, education, or extension (Davis et al. forthcoming). However, evidence shows that extension investments can yield high returns, especially when coupled with other investments. In Papua New Guinea, for example, Schmidt and colleagues (2021) showed that greater investment in extension services – along with transportation infrastructure – improves production practices and lowers marketing costs between farmgate and secondary markets. Highlighting these returns is critical to making the case for continued public spending on extension.

Organizational and management capacities and cultures

Studies of the organization and management of extension can facilitate better understanding of how extension services are managed within governance and funding structures, and how the **capacities** of extension organizations and individuals enhance extension performance, outcomes, and impacts (Figure 1; Birner et al. 2009). For example, a comparative analysis of research and extension reforms in China and India found that extension systems' effectiveness was hampered in China by a lack of incentives for communication between researchers and extension providers, while in India, limited individual capacity explained the lack of knowledge transfer from research to extension (Babu et al. 2015). A broader

study, including nine country cases, provided evidence on the value of investing in the human capital of agricultural producers. The study showed that human capital investment led to the successful development not only of technical agricultural skills, but also functional and social skills, empowerment and mindset changes, and managerial and business skills of agricultural producers (Davis et al. forthcoming). These holistic approaches to strengthening human capital resulted in greater empowerment and inclusion of women and youth in agricultural activities (e.g., women livestock advisers in India gained skills and confidence for public speaking and advisory roles) (Kumar et al. 2021). They also enhanced social cohesion and social capital (e.g., farmers in Rwandan farmer field schools gained a sense of belonging and inclusion) (Neza et al. 2021). Overall, the study showed that engendering real change in rural livelihoods requires that capacity investments go beyond simple transfer of technical skills to include complementary functional and business skills, and a focus on empowerment and inclusion.

Individual extension staff are a critical connection between farmers and other food system actors, but without sufficient skills and capacity, they can be a weak link that limits extension effectiveness. In a study in Malawi, researchers examined the efficiency of the information-delivery chain from researchers to extension agents to lead farmers to ordinary farmers (Niu and Ragasa 2018). Using a case study of pit planting, they found that information loss mainly occurred at the extension agents to lead farmers link, likely due to both teaching failures by agents and by selective attention and learning among lead farmers concerning all important details of the multidimensional technology. A low-cost, one-page handout or a short video for farmers with a checklist of important details of the technology can help reduce the loss of information. In the case of complex technologies, more intensive training of lead farmers and follow-ups and continued mentoring by extension agents of both lead and other farmers are necessary. Thus, for individual extension staff, continually updating skills and knowledge is critical.

Extension staff are often trained in basic technical topics, such as crop and animal production or natural resource management. This training is not necessarily translated into farm-level productivity. For instance, in Ethiopia, researchers found that extension advice led to improved use of inputs, but did not increase the level of productivity except indirectly (Berhane et al. 2018). In Malawi, Ragasa (2020) noted the importance of the quality of the information from agricultural extension (as measured by farmers' satisfaction with advice) for achieving agricultural development outcomes.

Globally, **incentives** provided to extension service staff, such as salaries and other support, have been shown to be insufficient and not well-tailored to the interests of different groups (Davis 2020; Ragasa and Ulimwengu 2020). For instance, only 27 percent of development agents surveyed in Ethiopia were satisfied with the government's incentive structure — even though this structure includes rewards, educational opportunities, certificates, and promotions (Berhane et al. 2020). There are a number of reasons. The first is simply that inflation negates any gains that the new incentive structure brought. Also, only 17 percent of the extension agents reported having received awards/prizes and only 41 percent reported receiving promotions, over a three-year period. Agents have also complained about the award and promotion process. Furthermore, they do not have sufficient resources to carry out their extension activities, which may affect their overall satisfaction (only 7 percent of respondents reported having sufficient resources to carry out their extension-related work in full). Lack of incentives and insufficient resources have also been pointed out in Central Asian and Caucasus countries; Liberia; and Viet Nam (especially for public staff in the latter two cases) (Davis 2020).

Using a choice experiment in Ethiopia, Regassa and colleagues (2021) found that education opportunities tend to attract and retain women and men to the extension service, while the availability of infrastructure and amenities, such as housing, electricity, and transport, tends to specifically attract women more than financial incentives. Similar effects were also observed for volunteer farmer trainers: In a smallholder dairy development project in Kenya, Rwanda, and Uganda, Kiptot and colleagues (2016) found that volunteer farmer trainers were initially motivated primarily by early access to information and technology, altruism, and improved social status. However, after several years of work, volunteer farmer trainers were more motivated by monetary factors, such as income earned from selling products and services (Kiptot and Franzel 2014; Kiptot et al. 2016).

Methods and approaches

There are many methods for providing extension services, from demonstrations to dramatic performances (Davis and Alex 2020). Increasingly, however, extension is conducted using local, participatory approaches that are digitally enabled and privately provided.

Using local farmers as voluntary extension staff is thought to reach greater numbers of farmers, be cost-effective,

enhance sustainability, and engender trust because the volunteers are community members with a common language and culture (Franzel et al. 2019; Kiptot and Franzel 2019). Research has shown that **volunteer farmer trainers** can be highly effective, training 20 farmers per month on average in East Africa in a dairy program (Kiptot and Franzel 2015; Kiptot et al. 2016). Behaghel and colleagues (2019) showed, in an impact evaluation of the same dairy program, that a model using these "contact" farmer trainers increased farmer revenues.

While models using local staff can help extend the reach of services, it is important to recognize that these approaches complement rather than replace traditional extension services. In Malawi, Ragasa (2020) showed that **lead farmers** served as an important link between the public extension system and farming communities, and assisted public extension staff by organizing meetings and farm demonstrations. However, although Malawi adopted the use of lead farmers as a national approach, coverage and effectiveness was limited, reaching only 13 percent of farmers (Ragasa 2020). The study notes that lead farmers were more effective in communities involved in projects and programs that provide them with intensive training and incentives and in communities where they are supported by active extension agents and local leaders. Ragasa also notes that access to quality lead farmers (quality is based on farmer perceptions), adoption behavior of lead farmers, and regular training of lead farmers have strong and consistent effects on awareness and adoption of most technologies being promoted (Ragasa 2019).

Kondylis and colleagues (2017) looked at a similar model employing lead farmers (here called contact farmers) in Mozambique. Using a field experiment, they examined the effects of enhancing the approach with direct central training of the contact farmers rather than the status quo extension approach. The three-day training led to an increase in adoption of sustainable land management practices – but only among the contact farmers themselves. Diffusion from contact farmers to other farmers was limited. Another study in Tanzania found that the lead-farmer approach had little effect on farmers' valuation of technologies when improved bean seed varieties and a chemical seed treatment were introduced (Morgan et al. 2020).

The examples above indicate that the lead, volunteer, or contact farmer models can exhibit variation in effectiveness. Lead farmer approaches can be improved through several means: regular training (Ragasa 2019), links to extension (Behaghel et al. 2018), and understanding and targeting personal and community motivations of volunteer farmers (Kiptot et al. 2016). For example, where social status is an important motivation, increased recognition by giving badges and t-shirts may be effective in improving motivation (Kiptot et al. 2016). Thus, these studies are not only important for assessing effectiveness of the model, but also for identifying means to improve effectiveness.

Another method thought to reach greater numbers of clients and reduce costs are the many digital extension approaches. These approaches are becoming more common. When PIM was first launched, research on **extension using information and communications technology** (ICT) was just beginning. An early study by Nakasone and colleagues (2014) reviewed available evidence regarding impacts of ICT and mobile phone access, market information advice, and extension advice offered via ICTs (mainly mobile phones). They were unable to draw firm conclusions in their review regarding extension and mobile phones or other ICTs because of the limited number of studies. Since then, the literature on the effectiveness of digital extension, specifically the role of ICT, has grown manyfold. For instance, Spielman and colleagues (2021) recently reviewed the role of ICTs in agricultural extension in developing countries. They were able to point to some 34 articles in a non-exhaustive list of empirical studies on use of ICTs by extension and advisory services. For instance, one study reviewed showed that digital technologies can increase the impact of extension (Abate et al. 2019). Using a randomized controlled trial in Ethiopia, Abate and colleagues (2019) found that video-mediated extension had a wider reach than conventional extension and led to greater knowledge and uptake of promoted agricultural practices.

Van Campenhout and colleagues (2021) conducted a field experiment in Uganda to explore the impacts of three complementary technologies – video, integrated voice response (IVR), and short message services (SMS). They found that video had a positive impact on knowledge, adoption of inputs and practices, and yields, whereas IVR and SMS had no significant impacts.

Preparing extension staff to use digital tools can be challenging. In Rwanda, researchers examined the **digital readiness** of extension staff using a representative survey (Spielman et al. forthcoming). Certain characteristics were associated with greater openness to change, modernization, and digitalization. For instance, those with access to smart technologies, with better education and training, and younger and private sector staff (as opposed to public sector) were more open to change.

Community engagement: Reaching women and youth

Engaging all community members, including women, youth, and other disadvantaged people, is critical for increasing the impact of extension services. Numerous studies have shown that **women** lack access to extension services and thus miss out on information that can lead to uptake of new technologies (see Kosec, Doss, and Slavchevska 2020; Magnan et al. 2020). At the **household** level, researchers have shown that it is important to provide information to all household members rather than just the household head, who is often a man. Some advocate that technology adoption research and outreach should target both women and men (Magnan et al. 2020).

Targeting women and men can have multiple benefits. In Malawi, Ragasa and colleagues (2019) compared households headed by a sole male adult, sole female adult, and dual-headed households, and found that joint participation in community processes and organizations, as well as access to information, increased food security. Similarly, Lecoutere and colleagues (2019) found in Uganda that extension programs targeting agricultural information to both men and women had positive effects on women's outcomes. In a field experiment where videos on maize management and production were screened to women and men, women's knowledge of improved maize practices increased. However, in Ethiopia, Abate and colleagues (2019) found that although targeting both the household head and spouse with video-mediated extension led to greater participation and knowledge among female spouses, it had no significant impact on uptake of practices.

At the **program** level, Mogues and colleagues (2019) compared community-based gendered advisory services (i.e., services targeting both women and men smallholders) in Mozambique and Tanzania using cost-effectiveness analysis along with econometric analysis from randomized controlled trials. Their research showed that the gendered modality was more cost-effective than the basic modality.

To engage **communities** and encourage **inclusion**, extension services can use game-based facilitation tools. In India, for example, researchers used learning games to engage communities on issues of natural resource management (Falk et al. 2019). Game-based facilitation tools proved to be effective in facilitating participatory water management development processes and encouraged young people, less educated people, and women to participate actively in decision-making.

Young people can be engaged in agricultural extension not only as recipients but also as providers of services. Franzel and colleagues (2020) looked at seven models that engaged youth in extension, including as village agents and paraprofessionals. Success of the models, as measured by sustainability and scalability, was observed in models that used fee-based service provision by youth and village agents. They found that youth running private extension initiatives lacked skills or strategies to effectively deal with other actors in the value chain.

To better engage youth in agriculture, extension should provide agricultural entrepreneurial training and support an enabling environment. However, extension staff often lack capacity in business and entrepreneurship topics. In Nigeria, Babu and colleagues (2020) found that lack of agricultural entrepreneurial training reinforced young people's negative view of agriculture as "unprestigious" and unremunerative. Babu and colleagues (2021) note that the promotion of youth entrepreneurship requires not just training, but also strategic investment in creating an enabling environment through effective policies and multistakeholder coordination and institutional support to ensure the holistic support that is needed. In addition, youth need access to low-cost digital technologies to network and to receive market information and extension services (Babu et al. 2021).

A vision for the future of extension and advisory services

Agricultural innovation and the enhancement of knowledge and skills among food systems actors are critical drivers for achieving the Sustainable Development Goals. As food systems become increasingly complex, expectations of their contribution to development are also expanding. Sustainable and inclusive food systems will require not only greater food production and investment in meeting nutritional, food safety, and other consumer needs, but also improved practices such as resource conservation, ethical commitments, and environmental sustainability, all while maintaining economic viability. These goals can only be achieved by equipping food systems actors to acquire and share innovative technologies, knowledge, attitudes, and skills. Agricultural extension and advisory services will undoubtedly continue to play a key role in these process-

es. Several PIM events[1] have discussed a future vision of extension, drawing on empirical evidence coupled with practitioner experience. The key takeaways are noted in this section.

Looking to the future, investment in extension must increase significantly to bring about desired outcomes and impacts in the medium and long terms. Such investment creates many positive societal spillovers, including increased rural incomes, improved literacy, and better food security and health, as discussed by McNamara (2020). To secure **funding**, extension proponents must learn to communicate these high returns to investment in extension services, and back up their evidence with better monitoring, evaluation, and learning systems. Where funding remains limited, extension must optimize resources. For instance, limited public funding could be put toward system support rather than into programs: policy and coordination, training, research and technical support services, communications systems, and monitoring and data collection.

Today, and even more so in the future, extension and advisory services are expected to reach well beyond production to support natural resource management, human health, social well-being, resilience, and climate change adaptation. To meet these broad demands, future extension systems should adopt multifunctional approaches, through which program staff educate farmers, broker relationships, link producers to markets, and sell products and services. This requires new **capacities**, both for individual staff and for organizations, and compensation commensurate with capacities. Recommendations on future individual staff capacities have been captured in another PIM synthesis piece that discusses the knowledge, skills, and attitudes needed by the "extension agent of the future" (Jiménez et al. 2021). For organizations, capacity will need to be built to manage multifunctional approaches and navigate complex food systems. With this growing complexity, professionalism for both individuals and organizations will be increasingly important and will require setting up certification and registration of extension staff, as well as continuous professional development.

More and more, extension **methods** will rely on digital technologies and big data. However, digital methods in extension cannot completely replace traditional methods. Rather, digital approaches must complement other methods and make the work of extension agents more efficient and effective by allowing them to reach greater numbers of people at a lower cost. Similarly, the use of big data can support extension and advisory services outreach, but it requires commitment to data transparency and continuity.

To engage the multiple and diverse **communities** that use extension, holistic approaches are needed. Such approaches consider intersectionality (Crenshaw 1991) and heterogeneity. Future extension needs to consider many characteristics and aspects of extension clientele: age, gender, race, caste, social group, intrahousehold dynamics, and community factors, to name a few. Services need to be situated within a community context rather than just focused on individuals. And rather than focusing on single methods, extension approaches must be flexible and adaptable to the needs of the target audience, whether in a formal classroom setting or through a communications application such as WhatsApp (Davis et al. forthcoming).

While change may be the only constant in the future, extension and advisory services will remain a key means for helping communities adapt. But these services cannot be static. To meet the shifting needs of communities, extension services themselves must continuously examine and adjust their characteristics – their governance structures and funding, organizational and management capacities and cultures, methods, and community engagement. Continued research on what works, where, and for whom in extension will be needed to provide direction for the future of extension.

Acknowledgments

Research summarized in this brief has been undertaken as part of the CGIAR Research Program on Policies, Institutions, and Markets (PIM) led by the International Food Policy Research Institute (IFPRI) and supported by the CGIAR Trust Fund and through bilateral funding agreements. A significant part of this work was carried out through the Feed the Future Developing Local Extension Capacity project (DLEC), in partnership with Digital Green and with generous support from the United States Agency for International Development (USAID).

1 Engaging youth and the private sector in extension and agricultural advisory services, Agricultural extension: Global status and performance in selected countries, Envisioning the future of extension, and Future extension: Innovations and evidence.

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RESEARCH PROGRAM ON Policies, Institutions, and Markets
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