

Borlaug LEAP Paper**The Role of Public-Private Partnerships (PPPs)
in Ensuring Technology Access for Farmers in sub-Saharan Africa****Bonphace Mangeni^{1*}****Bonphace Mangeni**

*Lead author email: mangeniboniface@yahoo.com

¹MSc. Crop Protection, Masinde Muliro University of Science and Technology, Kenya

Abstract

Public-private partnerships in agriculture are collaborative mechanisms in which actors in research fields and the private sector share resources, risk and generate innovation for the development of the agricultural sector, including the livestock, forestry, and fisheries sectors. Possible partners include research institutes, universities, and public extension agencies, producer associations, businesses, and individual producers in the private sector. In sub-Saharan Africa countries, these partnerships are often supported by government and international cooperation agencies. Collaborative partnerships are a key mechanism in developing reliable delivery streams for technology. Collaborative partnerships can also effectively bridge the gap between the distinctive competencies of the public and private sector, respectively, to better meet the needs of farmers. Interactions between publically-funded institutions and private sector entities occur in several areas such as seed production, farm implements and machinery production, disease diagnostics and vaccines manufacture, value-addition, and post-harvest agricultural processing and product quality testing and evaluation. This review focuses on the role played by PPPs in disseminating acceptable technology to farmers, explores the current state of the field, and details approaches and methods for establishment and promotion of PPPs in sub-Saharan Africa.

Key words: Partnerships, Technology, Public, Private, Farmers



Introduction

Agricultural research can improve living standards of the rural poor in developing countries by enhancing agricultural productivity. Agricultural research can improve sustainable use of natural resources, lower consumer prices for food and help accumulate physical and human capital among the poor (Spielman and Grebmer, 2004). These improvements can ultimately result in higher on-farm incomes, greater food consumption and better nutrition (Hazell and Haddad, 2001; Meinzen-Dick *et al.*, 2003).

In developing countries, about 94 percent of about US \$12.1 billion is spent annually on agricultural research by public-sector institutions. Private-sector investment in agricultural research is on the rise worldwide, and accounts for approximately 35 percent of global investment in research and development (R and D) with about US \$11.5 billion per annum since the mid-1990s (Pardey and Beintema, 2001; Spielman and Grebmer, 2004; Lynam *et al.*, 2016).

These investments aim to promote agricultural biotechnology research by both large multinational and small biotechnology firms (Byerlee and Fischer, 2001). The efforts are specifically directed towards crops, traits, and technologies that have potential to improve productivity. Effective collaborations play a crucial role in delivering beneficial outcome from agricultural technologies to farmers. Therefore, collaborative efforts between the public and private sector where both contribute to the planning, funding and implementation of activities are important to ensuring that technology gets to farmers efficiently.

In Africa, most collaborative partnerships involve nonprofit or non-governmental organizations (NGO), private companies, universities, government laboratories, and/or intergovernmental organizations. The focus is often on improving agricultural practices and responsible input usage (IFAD, 2011). These partnerships allow for sharing of international expertise. They build farmers' capacity by increasing knowledge of crop and natural resource management (IFAD, 2011). African agriculture is dynamic and involves a variety of stakeholders, challenges, alliances and risks (IFAD, 2011). The establishment of effective partnerships can lead to new configurations of power and development opportunities, establishment of alliances, more effective work processes and ultimately market transformations (Marco and Paul, 2011). The new techniques and technologies produced by partnerships then need to diffuse to all farmers, who can adapt them to local conditions. In order to do this effectively, farmers need adequate knowledge and skills about the new technology and how it fits into the agricultural system at large. Partnerships offer a facilitating mechanism for various players in the agricultural sector to contribute their skills and energy to the development of agricultural innovation (Von Braun and Ferroni, 2008). Country-specific research systems and regulatory environments are harmonized through public-private partnerships to address agricultural problems that cannot be solved by a single actor (Spielman and Grebmer, 2004).

In the public sector, partnerships offer a way to translate shared research outputs into useful tools that are relevant to farmers' needs. The Public-Private Partnerships (PPPs)



can also offer access to a wider variety of technology choices, spread the financial burden of research, and create connections with experts for capacity building (Horsch and Montgomery, 2004).

In the private sector, partnerships increase access to a robust knowledge base and offer a mechanism for sharing infrastructure and diffusion costs. PPPs also create opportunities to increase the effectiveness of technologies over time (Spielman and Grebmer, 2004). Companies contribute a variety of resources to such partnerships, including fundamental scientific data (such as access to genomics information); specific technology, including genes and traits; training to develop or move proven technology into crops important for food security; consultation on intellectual property, environmental stewardship, biosafety and regulatory matters, and food safety; and royalty-free licenses to patented technology (Ion *et al.*, 2014). The commercial marketing programs of the private sector reach out to farmers in Africa who are able to transition from subsistence into profitable agricultural production, bringing them new products and technologies along with ways to use such products and technologies safely and effectively.

Private sector entities and research institutes partner among themselves or with public entities to bring new technologies to smallholder farmers. For example, the New Rice for Africa initiative, a partnership between African and Asian researchers, is developing a new high-yielding rice variety, which is now grown in several African countries. The African Agricultural Technology Foundation (AATF) facilitates public-private partnerships to develop drought-tolerant maize. The 15 research centers of the Consultative Group on International Agricultural Research (CGIAR), a partnership of public and private entities promotes sustainable agriculture for food security in developing countries, focusing on crops that provide 75 per cent of food and protein requirements of developing countries. Collaborative Crop Research Programs (CCRP), a joint venture between CGIAR and research institutes achieve their goals through farmer participatory research involving experimentation by farmers in their own fields, and sharing of findings and new techniques developed from participatory research with other farmers. The information is personalized to reflect farmers' location, crop and language, and it includes crop advisories and weather forecasts. Farmers are the most important partners of all, because they have knowledge about their environment, and problems and solutions relevant to their needs.

Current Status of PPPs in sub-Saharan Africa

Current PPP initiatives in SSA agriculture spur innovation for agricultural development and have various advantages over other non-collaborative institutional arrangements fostering research and development (IFAD, 2011). Specifically, PPP initiatives in SSA have yielded several advantages. They reduce the costs and risks entailed in research; improve the quality and relevance of research results due to synergies among the partners, and ensure greater adoption by user groups; lead to the accumulation of complementary abilities, skills, and resources in farmers; lead to higher competitiveness and better market positioning as a result of improved competencies; and promote development and poverty reduction by providing small-scale farmers with access to knowledge and technologies (Marco and Paul, 2011). Most initiatives have



received major financing from the United States Agency for International Development (USAID) and the Department for International Development (DfID) in the United Kingdom among other donors. The priority areas of these agencies are sharing practical information about agricultural best practices with farmers.

Most PPPs in sub-Saharan Africa are majorly aimed at improving the productivity of food crops for smallholder farmers. However, some private sector multinational companies do promote the use of technologies oriented to large-scale commercial production (Crop Life, 2012).

Several partnerships between NGOs have focused on training integrated pest management (IPM) and responsible use of pesticides and other inputs used in IPM. Other partnerships are focused on bio-fortification of staple crops such as beans, wheat, cassava, maize, pearl millet, rice and sweet potatoes to alleviate micronutrient deficiencies. The Harvest-Plus Challenge Program, convened by the International Centre for Tropical Agriculture (CIAT) and the International Food Policy Research Institute (IFPRI), works with more than 200 agricultural and nutrition scientists around the world, including private sector developers. Harvest-Plus is partnering with relevant public sector actors to ensure that research outputs benefit farmers. Technology developed through collaborative partnerships is more likely to be accepted by farmers, due to the credibility of international organizations and the idea that technologies aren't being produced within a single sector. In PPPs, there are internal control mechanisms to prevent the development of solutions that serve individual interests, these mechanisms in turn, increase credibility with the public.

The African Agricultural Technology Foundation (AATF) manages the Water Efficient Maize for Africa (WEMA) project, a collaboration between African public sector institutions and several private sector companies, to develop drought-tolerant African maize using conventional breeding, marker-assisted breeding, and biotechnology. The AATF provides expertise on identification, access, development, delivery, and utilization of proprietary agricultural technologies (Chambers *et al.*, 2014). The AATF has also worked with some of the private sector partners to negotiate licensing agreements for proprietary technologies that allow royalty-free access and sharing of these technologies in order to improve accessibility of technology to farmers. AATF research covers a broad range of crops, with particular focus on staple foods such as maize and rice (AATF communication, 2016).

Researchers at the University of Bern partnered with the private sector to improve teff yields, the most important cereal crop in Ethiopia (Girma *et al.*, 2014). The collaborative project includes sharing of crop improvement and laboratory techniques. Teff is grown mostly in Ethiopia, and without public-private collaboration, research to improve this crop would be difficult to achieve. The Africa Bio-fortified Sorghum project is managed by a public-private consortium that is developing a more nutritious and easily digestible sorghum that contains high concentrations of amino acids, vitamins, iron, and zinc. The project, which relies on knowledge and capacity building from private sector companies, could improve the health of 300 million people by increasing nutritional quality of sorghum. Sorghum is the fifth most important cereal



crop in the world, and the main dietary staple for more than 500 million people in developing countries. The Nitrogen-Use Efficient (NUE), Water-Use Efficient (WUE) and Salt Tolerant (ST) Rice project, and *Maruca* pod borer-resistant cowpea project in Nigeria, are managed by a number of partners with farmer participation (AATF communication, 2016). Farmers are involved in the research and development process from inception through trial and implementation. In these cases, partnership is a key mechanism for engaging farmers and ensuring transfer of knowledge and technology in real time.

Some technologies, such as a new variety of cassava or beans that are disease resistant to diseases, or new ways of preserving fodder for dairy cattle in the dry season, or techniques for ensuring poultry chicks hatch on the same day, have been successfully implemented in Uganda due to enormous efforts of PPPs (AATF, 2015). These projects were largely successful because they piloted the technologies with smallholder farmers directly. No matter how simple or complex the technology, farmers have to be able to learn the new knowledge, skills or procedures required to use it. New knowledge is a part of any new technology, and without sufficient training the technology will not achieve its full potential.

Organizations involved in promoting PPPs

Successful PPPs in SSA promoting faster transfer of technologies to farmers have been as a result of donors who make it a requirement for organizations to establish collaborations in research that bring together both private and public sectors.

United States Agency for International Development (USAID)

The Feed the Future initiative by USAID has been focused on 19 countries based on 5 criteria: level of need, opportunity for partnership, potential for agricultural growth, opportunity for regional synergy and resource availability. Collaborations have played a key role in achieving the objectives of different programs. Across the board, all focus areas of funded projects require some type of credible partnerships that is multi-sectoral.

Partnerships need to strengthen researchers' capacity to conduct high-impact research-for development, while promoting constructive interactions between a wide range of partners and stakeholders. The Feed the Future Research Strategy calls for partnership and collaboration with U.S. and local university communities; the global donor community; international, regional and national nongovernmental organizations; U.S. Agency for International Development Missions; civil society organizations; implementing partners including extension agents; health service providers; private sector partners; national agricultural research institutes; farmers; and community members. Research efforts always identify key partnership opportunities as a means to leverage investments both in development and research. According to Feed the Future 2011 strategy report, the initiative, USAID partnered with other US agencies (the U.S. Department of Agriculture, the Board for International Food and Agriculture Development and the Association of Public and Land Grant Universities) is developing a new strategy for agricultural research, which focuses on three primary areas: (1) Improving productivity through research to reduce constraints to production, increasing



yields for major crops, and improving management practices; (2) Transforming key production systems through sustainable intensification in poor areas, integrating advances in soil fertility, agronomy, animal science, water management, market access, policies, and nutrition; and (3) Advancing food safety and nutrition by improving food diversity, and accessibility to nutritious foods, and reducing post-harvest losses and contamination.

The USAID's agricultural research activities are conducted through partnerships with other U.S. Government agencies, the Consultative Group on International Agricultural Research (CGIAR), university programs including the Collaborative Research Support Programs, developing country universities and institutions, the private sector, NGOs and other research organizations aim at ensuring that outputs of research and required technologies are efficiently utilized by the farmers at the right time (USAID, 2014)

Research activities of GREAT, AATF or PPP have a primary goal of ensuring the technology reach as many farmers as possible. For instance, Feed the Future's work in Ethiopia in 2014 served more than 217,600 farmers and other producers who applied new technologies and practices for the first time with Feed the Future's help. Producers applied improved technologies and management practices on more than 90,800 hectares of land. Projects funded through Feed the Future have formed valuable public and private partnerships across sectors to promote agricultural development in Ethiopia. The U.S. Government in partnership with the United Nations World Food Program, local partners including Guts Agro-Industry, and smallholder farmers is aiming to increase chickpea production in Ethiopia and develop a chickpea-based ready-to-use supplemental food to address moderate acute malnutrition in the country. The USAID and the Government of Ethiopia, in support of the New Alliance for Food Security and Nutrition, have partnered with DuPont Pioneer to provide improved varieties of maize seed and technical assistance to 32,000 smallholder farmers in Ethiopia. Feed the Future has also partnered with the International Center for Agricultural Research in the Dry Areas and the Ethiopian Institute of Agricultural Research to test and release new rust-resistant varieties of wheat. Feed the Future's work complements Global Agriculture and Food Security Program and bilateral donor investments that also support the Government of Ethiopia's food security programs.

The current Feed the Future Innovation Labs that incorporate multiple partners are essential to developing new technologies that can be transferred to the farmers through collaborative networks. Feed the Future is disseminating a number of technologies and practices in the agriculture sector to achieve a greater impact on poverty and under-nutrition in SSA. These technologies include high-yielding chickpeas, maize and rust-resistant wheat, commercial farm service centers, improved financial services, artificial insemination, milk cooling and storage, orange-fleshed sweet potato and dairy consumption. These are facilitated through partnerships, which provide a faster multi-sectoral mechanism for ensuring more farmers adopt appropriate skills successfully.

The primary motivations of USAID for public-private research partnerships have been to offset the costs and the risks of developing and disseminating innovations, and to leverage the strengths of both sets of actors to overcome the challenges of developing



innovative products and services (USAID, 2014). This increased emphasis on public-private collaboration for agricultural research also mirrors the broader trends highlighted throughout this report about the widespread use of PPPs as mechanisms to leverage, scale-up, and sustain development impacts.

In agricultural development, research partnerships typically include private sector actors (for example industry consortia, lead firms, producer organizations, cooperatives, and individual producers) and public sector institutions engaged in the development and distribution of knowledge and technology (including universities and research institutions) (Hardwick *et al.* 2007). Often, the broader social benefits of research for solving developmental challenges are perceived as exceeding the commercial benefits, which leads to an undersupply of research in certain fields. PPPs in agricultural research and development are increasingly becoming an effective mechanism to catalyze the necessary research, and to develop new technologies and products which benefit smallholder farmers and other marginalized groups in developing countries (FAO, 2013).

Comparatively, the timely impact of collaborative PPPs in ensuring technology gets to the farmer is far much higher than single-handed projects. FAO report (2013) indicates research at individual universities generating new technologies takes much longer to reach the farmer as compared to partnered projects.

International Fund for Agricultural Development (IFAD)

The IFAD supported PPP models involve: (1) formal contractual arrangements, whereby private-sector companies work with small-scale producers according to a variety of contractual arrangements, such as out-grower schemes or contract farming, and form a long-term commercial relationship, (2) delegation of particular private sector value chain functions, such as processing, to producer organizations, and (3) new joint ventures between private companies and producer groups (IFAD, 2014). The IFAD partners with other major players such as the Food and Agriculture Organization of the United Nations (FAO) and the World Food Program (WFP), as well as national governments, NGOs and CBOs. The goal of these partnerships is to increase knowledge transfer to ensure that farmers benefit from projects as intended. About 16.2 million households from 20 countries in SSA (Table 1) have benefited from various collaborative projects since the inception of IFADs PPPs. Ethiopia and Kenya have had the highest number of collaborative projects and therefore most involvement of PPPs.



Table 1: IFAD-funded Public-Private partnership projects involved in technology transfer

Country	Year of first program	Number of households benefiting	Number of projects
Kenya	1979	4,300,097	17
Angola	1991	201,600 households	5
Burundi	NA	613,579 households	11
Comoros	1984	53,855 households	5
Eritrea	1995	293,942 households	5
Ethiopia	1980	10,970,000households	17
Lesotho	1980	179,720 households	9
Madagascar	1975	694,600 households	15
Malawi	2003	1,452,950 households	12
Mauritius	1979	20,330 households	3
Mozambique	1983	2,193,489 households	12
Namibia	1992	9,000 households	1
Rwanda	1981	534,300 households	15
Seychelles	1992	5,520 households	2
South Sudan	2009	38,000 households	1
Swaziland	1985	41,555 households	5
Tanzania	1978	3,875,961 households	16
Uganda	1982	4,997,150 households	16
Zambia	NA	953,818 households	14
Zimbabwe	1980	1,143,000 households	5

In addition, some current PPP projects involving farmers in collaborations that have realized notable impacts in the regions of operations are detailed in the table below.



Table 2: Current IFAD projects working with PPP

Country	Project	PPP
Burkina Faso and Mali	Building farmers' incomes and safety nets while securing local energy supply in West Africa	Mali Biocarburant SA is a company producing biofuel from the energy crop Jatropha. MBSA has set up local foundations in both countries to strengthen the capacity of farmers and their cooperatives to add value to carbon credits. After harvest, farmers sell Jatropha through cooperatives to MBSA, where the oil is then extracted. The product is sold exclusively to local markets. This model integrates biofuel production into the smallholder farming system through intercropping or on unproductive land to avoid creating a conflict over land usage between food and fuel production. More than 10,000 smallholder farmers in three regions of Mali and two regions of Burkina Faso are projected to benefit from the project
Liberia	Smallholder Tree Crop Revitalization Support Project (STCRSP)	In Liberia, despite being the very first engagement of its kind, a very promising PPP has been instituted between the Ministry of Agriculture, STCRSP and the Liberia Agriculture and Asset Development Company (LAADCO), a private-sector exporter of cocoa and coffee. Approximately 1,000 farmers have benefited
Madagascar	Rural Income Promotion Program (PPRR) and Support Program for the Rural Microenterprise Poles and Regional Economies (PROSPERER)	To improve small-scale producers' market access by building up commodity chains and helping them optimize their produce and position in the chain Strengthening commodity chains, in this case by integrating traditional clusters into modern value chains, including silk, honey, fibre production and many more
Malawi	Rural Livelihoods and Economic Enhancement Program	The government partnered with two private sector entities (Exagris Africa Ltd and National Smallholder Farmers' Association of Malawi, or NASFAM) in order to develop value chains for groundnuts. The program's goal is to ensure that more farmers are able to produce groundnuts that meet required market standards and that there are buyers for their product Midway through the program, the number of smallholder farmers benefiting is already



		significantly greater (7,618) than the original target for the program (5,400)
Mozambique	Agricultural Markets Support Program (PAMA) and Rural Markets Promotion Program (PROMER)	Works to build the capacity of small and medium-sized rural traders to provide market services to the farmers and make rural products more marketable and profitable It created the innovative Rural Traders Development Program (PDCR), which facilitates the establishment of market relationships and organized trading schemes, and enables rural financial institutions to adapt financial products to the needs of traders and to set up a sustainable business development service PROMER builds on emerging opportunities for both domestic and export markets, and particularly for agribusiness investment, to improve the terms of trade for small-scale farmers. Using Strategic Investment Plans, the program works with private agribusinesses to strengthen their commercial interactions with smallholder farmers Approximately 33,000 farmers benefited from improved marketing services delivered by the participating rural traders. The partnerships launched by PROMER are still in their infancy but some 500 farmers were selling crops under contract arrangements by April 2013
Rwanda	Smallholder Cash and Export Crops Development Project (PDCRE) and Project for Rural Income through Exports (PRICE)	The original PDCRE forged a partnership between two tea producing cooperatives and private investors. The tea factories established by the private-sector partners bought directly from the cooperatives, which participated as equity shareholders in the tea factories. The same model is replicated in the new PRICE, which continues to promote investment in the rehabilitation of existing tea plantations and the establishment of new ones Cooperatives will acquire equity shares of 30 to 40 per cent in factories to be built on four greenfield sites. The first project benefited 20,000 tea growers. The new project aims to benefit 14,300 tea growers on new and existing sites
Sao Tomé and Príncipe	Participatory Smallholder Agriculture and Artisanal Fisheries Development	Aims to enhance returns on investments in traditional agricultural value chains (cocoa, coffee, and pepper and other spices) through the use of organic and Fairtrade certification and by linking to European markets



	Program	Across the four value chains, a total of about 5,500 households, or 25,000 to 27,000 individuals, have benefited from the program
Swaziland	Lower Usuthu Smallholder Irrigation Project	<p>Focuses on the intensification and diversification of high value crops, and subsequent integration of smallholders into the commercial economy. The project has linked smallholder farmers growing sugar cane to the nearby Ubombo processing mill</p> <p>Farmers are organized into associations and commit their land to a communally operated and irrigated block farm. In return, they acquire a share in the business and receive dividends from profits. All partners (growers, millers and government) are motivated to ensure high quality and sustainable production</p> <p>Nearly 3,000 members of 66 smallholder farmers' organizations are directly providing the mill with sugar cane. Thirty-four of these companies were operational by early 2013</p>
Uganda	Vegetable Oil Development Project, Phases I and II	<p>The project was designed to alleviate Uganda's dependence on imported vegetable oils by supporting the domestic production and processing of palm oil. It was the first example of an IFAD-supported PPP in Uganda.</p> <p>In its first phase, the project negotiated a tripartite collaboration between the government, a private company and smallholder farmers, to establish a plantation and processing units for production of vegetable oil on Bugala Island in the district of Kalangala. The partnership was reinforced through Interdependence: the palm oil mill provides a secure market for smallholder producers who guarantee a supply of raw material for processing. In the second phase of the project, the same collaborative business model is being repeated in a new location and further extended to oilseed production in order to show how similar tripartite partnerships can be forged within a new value chain More than 1,500 smallholder farmers are directly involved in production, while 2,000 are employed at the nucleus estate and 500 as field laborers on smaller plantations</p>
Ghana	Northern Rural Growth Program	The program helps set up contract farming arrangements between private partners (buyers and processors) and smallholder farmers



		<p>Products include cotton, shea nuts, maize, sorghum, soybeans, butternut, squash and groundnuts.</p> <p>The program provides technical support to facilitate the outgrower schemes; provides improvements in infrastructure, such as feeder roads or storage facilities, where needed by the private partners; and builds the capacity of farmers' organizations in terms of business development and good governance of their organizations.</p> <p>By early 2013, about 50,000 farmers had benefited from the program, and the number continues to increase</p>
--	--	---

Department for International Development (DFID)

The United Kingdom's Department for International Development supports numerous programs and projects designed to improve access to knowledge and technology (DFID, 2014). While DFID supports projects in all areas of poverty reduction, they have a specific focus on agriculture. The DFID's 2005 Research Framework Strategy prioritized knowledge management and broader dissemination of research results, underlining the need for better understanding of research impacts. Over the past decade, funding for agricultural research has more than doubled, and DFID committed £350 million to this field for the 2010–2015 period (Spielman, 2011). These resources are intended to be used to test new ways to encourage beneficiaries for adoption of new technologies or practices, to promote advanced research in UK universities and research institutions, and to support the work of CGIAR. Similar to USAID, DFID's research work is complemented by partnerships with international universities, UK research councils and foundations, UK government departments and other international agencies. DFID focuses its partnerships with the private sector on product development (DFID, 2014).

About 214 agriculturally relevant projects have been completed by PPPs, with 5 still underway at this writing. Of these, 86 focused on crops, 25 in agroforestry, 25 in natural resource systems and 33 on enhancing agricultural productivity (DFID, 2014).

The Swiss Agency for Development and Cooperation (SDC)

Switzerland has a long history of promoting research through collaborations with developing countries. For more than 30 years, research and innovation have been key priorities for Switzerland's development agenda. Currently, SDC invests around US\$ 52 million annually in research and development initiatives. Agriculture and food security are priority sectors for SDC research programs, and the largest tranche of their research budget is channeled to CGIAR to support agricultural research. A new initiative, the Swiss Program for Research on Global Issues for Development (r4d program) is being implemented by the SDC and the Swiss National Science Foundation (SNSF). This broad program is designed to undertake relevant research to solve global problems in developing countries. Of the five research themes, one is specifically



focused on innovation for agriculture and food security. This program has a ten-year budget of US \$101 million (r4D, 2014).

Canada's International Development Research Centre (IDRC)

Canada's International Development Research Centre (IDRC) was established in 1970 with the mandate to encourage and support researchers in developing countries to find practical, sustainable solutions to social, economic, and environmental challenges. The IDRC works extensively with partners including other donors, governments, and the private sector, in order to increase the resources devoted to developing country research. Agriculture is a priority for the IDRC and it has launched the Canadian International Food Security Research Fund that supports a wide range of research initiatives intended to solve food security challenges, including: (1) systems that reduce dependence on high energy-use agriculture; (2) the use of underutilized species; (3) utilizing Canada's expertise in biotechnology to improve crops and for new livestock vaccines; (4) increasing the nutritional value of crops to combat malnutrition; and (5) rehabilitation of degraded soil and soil management. This five-year, \$62 million project provides support for partnerships between Canadian research organizations and developing countries research institutions. (IDRC, 2014)

Approaches and methods in PPPs in Agriculture in SSA

Projects use a wide range of methods to disseminate and encourage uptake of the technologies. In order to do this successfully, many PPPs rely heavily on farmer groups, which provide a structure for project activities including provision of training, inputs and credit. Some projects encourage farmers to form new groups, while others work with existing groups. Both have their advantages. Existing groups already have a level of identity and solidarity, which provides a ready-made forum to introduce new technology. These groups have established ways of working together and there will be an element of trust among members. Relying on existing groups to implement a project, however, may make it difficult for other farmers to join in. With the formation of new groups, farmers who are not already members of a group have an equal chance of benefiting from the project. Farm Africa's Maendeleo Agricultural Technology Fund (MATF) has promoted such models with collaborative partnerships with organizations such as International Centre for Tropical Agriculture, International Maize and Wheat Improvement Center, Climate Smart Agriculture, New Rice for Africa, International Potato Center, Drought-Tolerant Maize for Africa, Agricultural Research for Development, Forum for Agricultural Research in Africa, International Crops Research Institute for the Semi-Arid-Tropics, Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) and International Livestock Research Institute. A successful feature, in particular, of the collaborative projects is the training of trainers to enable technology dissemination and knowledge sharing at a greater scale.

Training of trainers is a deliberate strategy to increase the impact and sustainability of technologies by ensuring there are people within the local community to share resources beyond the scope of the project. These newly trained community members will also be a source of expertise and advice to other farmers when the project comes to an end. This works particularly well where there is already a structure in place. A



cassava project in Uganda, for example, uses the “Extension Link Farmers” within the district farmers’ associations, who are already playing an important role in linking local group members to technical support and advisory services. In some, cases training of trainers creates ill-feeling, as those who are not participating feel they are missing out on resources or opportunities. In these cases where equipment for implementing the technology is provided, care must be taken to ensure equity in use and dissemination to avoid resentment among neighbors. While these implementation details can pose some challenges, training of trainers at large has been reported to be largely successful.

On-farm demonstrations are an effective method for showing farmers how a technology works and allowing them to see for themselves how results can be accomplished. Some projects set up demonstrations at research stations, but more often demonstrations are established on farmer’s fields. This also allows other farmers to see the technology in an environment similar to their own farms, making the use of the tool or practice more relatable. Projects have used demonstration plots as sites to hold field days when large numbers of people from the surrounding area are invited to see and ask questions about the technology.

Many of the methods described above involve a high degree of participation by farmers. A number of projects use innovative participatory methods to encourage learning and decision-making among farmers. Participatory evaluation is used in projects, particularly those focused on food crops, to identify varieties that are suitable for local conditions. For projects involving livestock, for instance a silage preparation project, participatory budgeting helps farmers analyze the costs and returns from livestock enterprises at different times of the year. This is an important step in recognizing that preserving fodder for the dry season could, in some cases, save them money.

Some projects have made occasional use of mass media, particularly radio, as a way of creating widespread awareness of new technologies or reporting specific events. More often, print media such as posters and leaflets, are used to publicize project activities or technical summaries for farmers.

A number of projects for crops like banana in Uganda and other parts of East Africa initially had to rely on sources in Kenya to supply tissue culture plantlets for their farmers.

In Tanzania, when transport systems or quality control procedures broke down, farmers were unable to acquire necessary inputs. Project partners responded by looking for sources nearer to the project area. To address challenges in a number of projects that involve technology transfer and application, the project partners help farmers form a co-operative that could negotiate bulk purchase of materials from a wholesaler. With the cassava, beans and sweet potato technologies, setting up systems for producing and distributing clean (disease-free) planting material is an important project component. Farmer groups have proved an effective way of doing this, with some groups creating new businesses out of supplying planting material to farmers in their locality and further away. Most collaborative projects are always very careful to ensure that their



partnership include the expertise that is needed to provide appropriate training and technical support to farmers. Continued access to expertise is also needed to help farmers identify and deal with problems that may occur later on.

In order for the sustainable development goals (SDGs) to be realized in SSA, particularly in agricultural development, partnership is crucial to spur faster growth through sharing knowledge and skills. Collaboration will be very instrumental in delivery of training sessions to cohorts of agricultural researchers, establishment of successful breeding programs; upgrading skills and investment in value chains; improving nutrition and food security; and increasing knowledge exchange about agricultural best practices. Single institution research programs geared towards generating knowledge and skills meant for the farmer stand to benefit greatly from engagement with both domestic and international partners through PPPs.



References

- AATF. African Agricultural Technology Foundation. World class technologies for farmers in Africa. <http://aatf-africa.org/files/files/publications/AATF-tenth-anniversary-book-web.pdf> Accessed January 23, 2017
- Boettiger S. (2013) Crowd Sourced Lessons About Scaling Seed Systems. <https://agrilinks.org/library/crowd-sourced-lessons-about-scaling-seed-systems>. Accessed January 23, 2017
- Byerlee D. and Fischer K. (2001) Accessing modern science: Policy and Institutional options in developing countries. *IP Strategy Today* 1. <<http://www.biodevelopments.org/ip/ipst1n.pdf>>. Accessed December 19, 2003.
- CAADP. (2013) Comprehensive Africa Agriculture Development Program website <www.nepad-caadp.net> Accessed January 23, 2017
- Canadian International Food Security Research Fund. (2014) International Development Research Centre. Web <http://www.idrc.ca/EN/Programs/Agriculture_and_the_Environment/Canadian_International_Food_Security_Research_Fund/Pages/ProjectsList.aspx> Accessed January 25, 2017
- Chambers J.A. Zambrano P., Falck-Zepeda J.B., Gruère G.P., Sengupta D. and Hakanon K. (2014) GM agricultural technologies for Africa: A state of affairs. Crop Life International (2012) Benefits of public private partnerships. Working together to help farmers.
- Spielman J.D. and Klaus von Grebmer (2004) Public-private partnerships in agricultural research: an analysis of challenges facing industry and the consultative group on international agricultural research. EPTD Discussion Paper No. 113. IFPRI.
- FAO. (2013) Agribusiness public-private partnerships – A country report of Kenya. Country case studies – Africa. Rome *Feed the Future: Global Food Security Research Strategy*. Rep. Washington, DC: United States Agency for International Development, May 2011. 54 Ibid
- Girma D., Assefa K., Chanyalew S., Cannarozzi G., Kuhlemeier C. and Tadele Z. (2014) The origins and progress genomics research on Tef (*Eragrostis tef*). *Plant biotechnology journal*. 12(5): 534-540. doi: 10.1111/pbi.12199
- Hartwich F., Jaime T., Alejandra E., González C., Ghezan G., Jorge M.P. Vázquez-Alvarado, José Antonio Silva, José de Jesús Espinoza, and María Verónica Gottret. (2007) Building Public–Private Partnerships for Agricultural Innovation. *Food Security in Practice, Technical Guide Series*. Washington, D.C.: International Food Policy Research Institute



Hartmann A., Haras H., Kohl R., Linn J., Master B. and Sourang C. (2013) Scaling Up Programs for the Rural Poor: IFAD's Experience, Lessons and Prospects (Phase 2). *Brookings Institute Global Working Papers*

Hazell P.B.R. and Haddad L.J. (2001). Agricultural research and poverty reduction. 2020 Vision Discussion Paper. Washington, D.C. International Food Policy Research Institute

Horsh R and Montgomery J. (2004) Why We Partner: Collaborations Between the Private and Public Sectors for Food Security and Poverty Alleviation through Agricultural Biotechnology. *AgBioForum*, 7(1 and 2): 80-83. ©2004 AgBioForum

IFAD. (2011) Private-Sector Strategy: Deepening IFAD's engagement with the private sector

IFAD. (2014) IFAD and public-private partnerships: Selected project experiences

IFPRI. (2007) Building Public-Private Partnerships for Agricultural Innovation in Latin America. Lessons from Capacity Strengthening. IFPRI Discussion Paper 00699, May 2007

Investing in Agricultural Research and Development. United States Agency for International Development, Web. 07 August 2014. <<http://www.usaid.gov/what-we-do/agriculture-and-food-security/investing-agricultural-research-and-development>>

Ion A., Beyard K. and Sedaca S. (2014) Synthesis of trends in public-private partnerships (PPPs) for Improving Food Security and Rural Development through Agriculture Report. Prepared by Carana Corporation for the Food Systems Innovation initiative.

Kanampiu F., Omany G., Muchiri N., Nang'ayo F., Werehire P., Tyrell D. and Sthamer V. (eds) (2005) Launch of STRIGAWAY® (IR-maize) technology for Striga control in Africa. Proceedings of the launch of the STRIGAWAY® (IR-maize) technology, 5-7 July 2005, Kisumu, Kenya.

Lynam J.K., Beintema N.K., Roseboom J. and Badiane O. (2016) Agricultural research in Africa: Investing in future harvest. International Food Policy Research Institute. Washington, D.C

Marco F. and Paul C. (2011) Public-Private Partnerships and Sustainable Agricultural Development. *Sustainability*, 3, 1064-1073.

Meinzen-Dick R.S., A. Adato, L. Haddad and P. Hazell (2003) Impacts of agricultural research on poverty: Findings of an integrated economic and social analysis. EPTD Discussion Paper 111/FCND Discussion Paper 164. Washington, D.C.: International Food Policy Research Institute. Monsanto. 2003.



Pardey P.G. and Beintema N.M. (2001) Slow magic: Agricultural R and D, a century After Mendel. Technical Report 36, Agricultural Science and Technology Indicators. Washington, D.C.: International Food Policy Research Institute.

Research at DFID. United Kingdom's Department for International Development. Web. 07 August 2014.

Research for Development. Swiss Agency for Development and Cooperation. Web. 07 August 2014. <<http://www.r4d.ch/E/Pages/home.aspx>>

Spielman D. (2011) Changing Donor Priorities and Strategies for Agricultural R and D in Developing Countries: Evidence from Africa. Prepared for the ASTI-IFPRI/FARA Conference: Conference Working Paper 8, 2011.

Sara B, Tamara S., Alana C, Karin C, Karl P, Heather F. (2013) Demand-Driven Innovation. World Bank. <<https://agrilinks.org/library/demand-driven-innovation-white-paper.>> Accessed July 14, 2016 <<http://demand-driven.net/>> Accessed January 26, 2019

Von Braun J. and Ferroni M. (2008) Public-Private Partnerships in Agriculture Research: Towards Best Practice and Replicable Models; The World Bank: Washington, DC, USA.

