PAEPARD

Public-private partnership experienced by PAEPARD

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list of acronyms

AFD: French Development Agency
AgriTT: Programme 'Working in Partnership for Agricultural Technology Transfer' (Malawi)
AIF: Agricultural Innovation Facilitators
AIV: African Indigenous Vegetables
ARD: Agricultural Research for Development
ARFA: Association for Research and training in Agroecology
BAIH: Benin Agribusiness Incubation Hub
CAPAD: Federation of farmers' associations for development (Burundi)
CASADD-VR: *Centre d'Action pour la Sécurité Alimentaire le Développement Durable et la Valorisation des Ressources* (Togolese NGO)
CSA: *Collectif Stragégies Alimentaires* (Belgian NGO)
CIGMAG: Citrus Growers and Marketing Association of Ghana
COLEACP: Europe-Africa-Caribbean-Pacific Liaison Committee
CRF: Competitive Research Fund
EAFF: Eastern Africa Farmers Federation
FANRPAN: Food, Agriculture and Natural Resources Policy Analysis Network
FAO: Food and Agriculture Organization of the United Nations
IF: Incentive Fund
IP: Innovation Platform
KAIP: Kenyan Aflatoxin Innovation Platform
MAPAC: Malawi Programme for Aflatoxin Control
NASFAM: National Smallholder Farmers' Association of Malawi
NGO: Non-Governmental Organizations
PAEPARD: Platform for Africa-Europe Partnership in Agricultural Research for Development
PPP: Public-Private Partnership
SME: Small and Medium-sized Enterprises
ULP: Users-Led Process
WHO: World Health Organization of the United Nations

Partnership business to farmers through research examplified in the project on African indigenous vegetables in Uganda.

PAEPARD promotion of public-private partnership

Despite efforts over recent years to improve the status of agriculture in sub-Saharan Africa, little change has been noted, due partially to the fact that efforts have come from individual entities, which had short-term funding or lacked the necessary expertise to scale up research outputs.

Disconnect between researchers and end-users has further hindered the success of such efforts. The Platform for Africa-Europe Partnership on Agricultural Research for Development (PAEPARD), therefore designed a multi-stakeholder partnership approach to overcome existing shortcomings in agricultural research for development (ARD). Through a variety of brokerage mechanisms, PAEPARD has supported the formation of consortia made up of multi-stakeholder partners from the public and private sectors, which are intended to address priority research issues and respond to user needs.

The public sector can be represented by government ministries, such as the Ministry of Agriculture or Ministry of Industry and Trade; regional and local-level government representative offices; state banks involved in financing rural development; state-owned enterprises, such as seed companies and agro-processing facilities; and publicly funded research institutions, marketing boards and universities.

On the other hand, the private sector encompasses all for-profit businesses that are not owned or operated by the government, as well as independent non-profit organizations, such as non-governmental organizations (NGO) and charities. The private partners involved in PAEPARD consortia include farmer organizations, agro-processing enterprises, input supply companies and NGO.

What drives public-private partnership?

Public-private partnerships (PPP) are mutually beneficial relationships that are formed between public and private sector stakeholders. According to Vervynckt and Romero[1], the long-term contractual arrangements, which PPP are founded on, allow states to delegate to the private sector the delivery and management of infrastructures, assets and services of public interest[2].

An FAO publication outlines the following factors as key to the success of a PPP: "public benefits anticipated from the partnership are clearly defined, investment contributions and risks are shared, and active roles

[1] Vervynckt, M. and Romero, M.J. 2017.Public-Private Partnerships: Diffusing the ticking time bomb. Eurodad. Available at: http://www.eurodad.org/files/pdf/59d5d29434577.pdf

[2] PAEPARD Policy Brief Nº 2, March 2016. Available at: www.paepard.com

Creation of a retailing shop in Ouagadougou for organic produce produced and processed by farmers groups.

exist for all partners at various stages throughout the PPP project lifecycle"[3].

The use of PPP is a growing trend in agricultural economies. The main reason for organizations to partner in a PPP is the realization that individually they cannot effectively and efficiently address development challenges. Producers, the private sector (including processors and distributors), and the public sector have different roles in the development of new agriculture technologies and approaches for sustainable primary production.

The differing approaches and expertise that these stakeholders bring to a PPP adds value to the partnership, enhancing their combined capacity to implement innovations. Working together, public and private sector partners are therefore often able to establish a win-win partnership and accomplish far more than any organization can alone.

For private sector organizations, the main motivation for partnering with different stakeholders is to secure reliable sources of raw materials that meet their specifications regarding timeliness of delivery, and quality and volume, at the least possible cost. With a larger pool of suppliers, the private sector can open or expand into new markets and rapidly accommodate changes in consumer preferences.

Working as part of a PPP therefore enables private sector enterprises to take advantage of public goods and services to diversify their customers and increase their income. Where farmers and producer organizations are part of a PPP, the main drive is to improve their incomes and livelihoods. PPP enable producers to build strong business relationships, and offer them opportunities to expand production and access to new markets, finance and technologies.

The public sector is generally motivated to join a PPP by the desire to achieve economic growth, and reduce poverty and inequality.

Most public sector organizations join a PPP to maximize and sustain development impact in a cost-effective manner by leveraging private sector knowledge and investment. Educational institutions may be involved in a PPP to contribute to learning and capacity building, whilst researchers' involvement is based on the desire to generate, implement and scale their research outcomes.

Exploiting the capacities of different stakeholders

Organizations engage in PPP for complementarity of resources, competencies, and assets. Each partner brings an essential capacity or holds a specific responsibility and all partners share the risks and benefits. The private sector can provide farm inputs, market access and value addition through the processing and packaging of products. Private sector partners therefore help to increase the economic performance of a PPP and enable the partnership to respond to market or farmer demands.

For this reason, private sector involvement in ARD partnerships is important for long-term sustainability once the initial partnership funding has run out. Identifying and securing access to the most relevant private sector capabilities is an important element of PPP success.

Though NGO are independent of state control, and therefore defined as part of the private sector, they are not profit-driven, which means NGO often act as neutral mediators between public and private stakeholders and the link between farmers and researchers in a PPP.

In addition, an NGO may contribute to the capacity building of farmers' organizations, the provision of extension services, or the establishment of innovation platform (IP) to help turn ideas into viable enterprises. The involvement of farmers' organizations, which also come under the private sector, enables a PPP to better respond to the needs of smallholders and ensures that innovations are taken up by the primary beneficiaries.

[3] The High Level Panel of Experts on Food Security and Nutrition. 2018. Multi-stakeholder partnerships to finance and improve food security and nutrition in the framework of the 2030 Agenda. Available at: http://www.fao.org/fileadmin/user_upload/hlpe/hlpe_documents/HLPE_Reports/HLPE-Report-13_EN.pdf?

Generally, the strength of public sector involvement in a PPP stems from its legal authority, the mandate that it has to act directly with other stakeholder groups, its legitimacy, and its control of resources. The public sector can help to create a supportive regulatory environment for the implementation of the partnership's goals with appropriate incentives for private sector investment and the inclusion of smallholders.

The public sector can also help to scale a PPP through provision of financial resources, as well as other services and supply systems, including the creation of an enabling environment for formal seed systems or organic product homologation.

PAEPARD role in strengthening multi-stakeholder partnerships

To strengthen the capacity of African ARD stakeholders to take part in agricultural innovation and participate in European development initiatives for Africa, PAEPARD designed and experimented with mechanisms for sustainable African-European multi-stakeholder partnerships. This approach has led to the formation of stable consortia, improvements in the accessibility of resources for both men and women farmers and entrepreneurs, improved uptake of new technologies and innovations, increased knowledge sharing, new job opportunities, and improved food and nutrition security. Importantly, the multi-stakeholder partnerships supported by PAEPARD have also resulted in more funding opportunities for participants[4].

PAEPARD played a key role in brokering the PPP that made up consortia, in particular, the Platform helped attract private sector small and medium-sized enterprises (SME) to partner with consortia, and trained a group of facilitators to strengthen partnership formation and management.

> Promoting private sector participation

Initially, PAEPARD experienced challenges in involving the private sector in its multi-stakeholder consortia. A major constraint to the participation of SME stems from their reluctance to engage with NGO or government-driven research activities due to their limited experience and mistrust of working with such organizations. The challenges of working with smallholders in outgrower schemes also limits the private sector's interest in submitting proposals for multi-stakeholder partnerships, which require significant time and resource commitments (human and financial).

To mobilize private sector partners PAEPARD sought to create better understanding of the win-win outcomes for all partners, the constraints that private sector partners operate under (e.g. time and resources), and the required incentives for private sector participation (e.g. ownership of the research product).

During its second phase, PAEPARD increased the participation of private sector partners, including farmer organizations, in its multi-stakeholder consortia, through its users-led process (ULP), competitive research fund (CRF) and incentive fund (IF) mechanisms[5]. Each of these mechanisms were funded by PAEPARD, providing the necessary financial incentive for private sector involvement in consortia.

> Agricultural innovation facilitators (AIF)

Within the PAEPARD framework, 40 AIF were selected, trained and supported, to broker and facilitate the multi-stakeholder partnerships.

The regional farmer organizations involved in the ULP nominated their own AIF to facilitate the process and ensure the researchers and non-researchers in the consortia discussed needs and challenges as equal partners. Through this approach, PAEPARD has facilitated better interaction between farmers and researchers, as well as built capacities among farmers for partnership formation and collaboration with the private sector[6].

Knowledge transfer is the key role of agriculture innovation facilitators, here a farmer from East Uganda to a women's group in central Uganda.

[4] PAEPARD Policy Brief N°6, December 2017. Available at: www.paepard.org

[5] PAEPARD Policy Brief N°5, October 2017. Available at: www.paepard.org

[6] Hawkins, R. et al. 2018. Strengthening capacity for agricultural research for development: Collaboration for results. FARA. Available at: www.paepard.org

The role of producer organizations in PAEPARD

Through the central involvement of producer organizations – the end-users of PAEPARD consortia research outcomes, particularly those established via the ULP – the Platform has facilitated demand driven research and acknowledged the role and contribution of local indigenous knowledge. The coming together of academic and technology researchers with end-users, such as farmers' groups, farmers' organizations or agri-food entrepreneurs, has resulted in improved uptake of research outcomes among the intended beneficiaries.

Ghana citrus consortium

The Ghana citrus consortium brought together a range of stakeholders to address the high level of fruit losses due to the presence of the angular leaf spot disease (*Pseudocercospora* leaf and fruit spot) and fruit flies in the regions where citrus fruits are produced. One of the key partners in this consortium is the Citrus Growers and Marketing Association of Ghana (CIGMAG), which has over 3,000 members whose income depends on citrus fruit farming. The central involvement of CIGMAG enabled the consortium to focus on research developments that address small-scale citrus farmers' need for a more readily available and affordable alternative to synthetic fruit fly bait.

The consortium trialed the use of leaf water extract from an indigenous plant, *Pimenta dioica*, which contains high amounts of natural methyl eugenol, to repel some species of fruit flies, particularly *Bactrocera dorsalis*. The farmers who were given the extract in the pilot recommended that CIGMAG make it available for use in the following citrus season. The consortium has since raised about 50 seedlings of *P. dioica* to distribute to each CIGMAG farmer so that they can harvest the leaves themselves. CIGMAG prominent role in the consortium has therefore ensured that its farmer members have better access to information and effective training to sustainably control pests and diseases. The nationally representative membership and economic weight of CIGMAG could influence policy makers to deliver national regulations to fight citrus pests and diseases with good practices.

Nigeria cassava consortium

The high cost of poultry feed is a major constraint for farmers in Nigeria, with formulated feed accounting for 60-70% of production costs. The PAEPARD consortium in Nigeria therefore sought to explore the use of cassava as a cheaper alternative material for poultry feed. A one-week training workshop organized by the consortium in 2016 aimed to build the capacity of small-scale farmers to develop value-added cassava feed. Members of the Poultry Association of Nigeria and the Feedmillers' Association of Nigeria were targeted since they had initially identified the challenge of high feed costs for the industry's profitability. As a result of the workshop, two influential farmers' groups (Unit Six Multipurpose Cooperative and Imo State Cassava Growers Association) joined the consortium to collaborate in the production and use of cassava as a raw material for poultry feed.

The participation of four farmers' organizations in the consortium not only ensured that it addressed a pressing challenge for Nigerian poultry farmers, but also enabled the smooth transfer of knowledge on the processing of fresh or dried cassava into poultry feed and other value added products. With this knowledge and training in health and quality regulation, the farmer members of these organizations have been able to scale-up the innovation in Nigeria.

Burkina Faso *Trichoderma* consortium

To address the accelerating degradation of soil in Burkina Faso, PAEPARD supported the establishment of a consortium focused on promoting the use of a natural soil fungus (*Trichoderma sp.*) in the production of bio-compost for vegetable farming. Beyond improved yields – duly recorded in tomato, Irish potato and onion[7] – the use of *Trichoderma sp.* reduced the incidence of vegetable crop diseases. The Téga Wendé women's group, which produces and sells compost, was brought into the consortium to provide the necessary composting for field schools to demonstrate the benefits of *Trichoderma sp.* enriched compost to local farmers.

With Téga Wendé on board, the consortium activities have seen a significant expansion in the production and use of organic matter by local farmers. In fact, the Téga Wendé group has almost doubled its compost production from 45 tons in 2014 to nearly 76 tons in the first half of 2017. The revenue generated by the sale of the compost has increased four-fold over this period to €2,763 in the first half of 2017. In addition, the study tours of Téga Wendé have made it possible to replicate the processing structure used by the group to establish 12 new rural composting units in Burkina Faso. The involvement of the women's producer group has been integral in enabling the consortium to upscale traditional composting methods for improved agricultural productivity and food security.

[7] Savadogo, A. et al. 2016. Effects of organic amendments enriched with *Trichoderma sp.* on vegetable production in sub-Saharan area. Presentation at the side event of PAEPARD, 7th African Agriculture Science Week, 14 June 2016, Kigali, Rwanda. Available at: https://www.slideshare.net/francoisstepman/effects-of-organic-amendments-enriched-with-trichoderma-sp-on-vegetable-production-in-sub-saharan-area

Promotion of compost enriched with Trichoderma local strains for supporting innovation by public funds, here the EU representative in Benin.

East Africa livestock feed consortium

With the support of PAEPARD since 2012, the Eastern Africa Farmers Federation (EAFF) has engaged with national and international researchers on the development of quality livestock feed for increased productivity[8]. A key priority of the consortium has been limiting the aflatoxin contamination of livestock feed through information and knowledge management at the regional level. With German funds, EAFF established the Kenyan Aflatoxin Innovation Platform (KAIP). KAIP provided further support to elaborate and present several project proposals to create awareness among farmers of aflatoxin control mechanisms, in response to international research calls (from Germany, USAID etc.). The main activities of the consortium entailed field trials and building the capacity of farmers in the adoption of tested on-farm technologies for the reduction of aflatoxin contamination in food and feed.

EAFF has been responsible for the logistics of the entire programme in regards to organizing the field exchanges, seminars and conferences that have taken place in Kenya. For instance, the Federation coordinated the initial learning visit to Kenya for the conception of the AFLANET and AflaZ programmes. F&S Scientific – a private sector supplier of testing and analysis technologies – government institutions, research institutions from Germany and Kenya, and farmers (particularly those in the aflatoxin hotspots in Kenya, e.g. Machakos) were all involved in the learning visit. EAFF also championed a roundtable on the theme of 'Building a multi-stakeholder approach to mitigate aflatoxin contamination of food and feed' in Brussels in January 2016. EAFF leadership has consequently been integral to the cooperation of the different stakeholders in the East African livestock feed consortium and in raising awareness of the aflatoxin challenge.

[8] Gachagua, M. and Muchiri, S. 2016. The Red Diamond – The extensive livestock value chain. PAEPARD fact sheet, EAFF. Available at: www.paepard.org

Malawi and Zambia groundnut consortium

Groundnuts form the basis of food and nutrition security for the majority of smallholder farmers in Malawi and Zambia, and make up a large part of agricultural exports, but they are often prone to aflatoxin contamination. The PAEPARD-facilitated groundnut consortium aims to reduce pre- and post-harvest waste in the groundnut value chain by promoting sustainable aflatoxin control mechanisms.

Smallholder farmers, drawn from the National Smallholder Farmers' Association of Malawi (NASFAM) and Eastern Province Farmers' Cooperatives membership base, are at the heart of the project. Farmers participated at two levels, either as lead farmers who took part in the participatory research, or farmers who received targeted extension services for improved aflatoxin mitigation practices through publications, radio broadcasts and face-to-face demonstrations. The lead farmers allocated a portion of their land for instituting the consortium's research protocols and their plots were used for on-farm demonstrations and field extension days. By 2017, a total of 5,708 farmers (over 50% of whom were women) had been reached through the tiered targeting system.

Prior to 2014, researchers, policy advocates and farmer organizations were not working closely together to tackle aflatoxins in the groundnut value chain on the basis of clearly defined mutual objectives and a shared understanding of farmers' needs. The active participation of farmers in the consortium activities was vital to ensure the dissemination and uptake of the project's aflatoxin control mechanisms[9]. The consortium is now moving from short-term, informal relationships between the different stakeholders to more durable and pervasive relationships, where public partners (e.g. the Food, Agriculture and Natural Resources Policy Analysis Network [FANRPAN], Lilongwe University of Agriculture and Natural Resources) and private partners (e.g. NASFAM, Eastern Province Farmers' Cooperatives Limited) are not only concerned with sharing information, but also engaging in joint planning and shared commitments to common goals.

Burundi potato consortium

Over time, small-scale potato farmers in Burundi have developed intercropping systems in response to acute land scarcity, pests and diseases, and unreliable food markets. To increase the crop performance and resilience of these potato farmers, the consortium led by the *Confédération des Associations des Producteurs Agricoles pour le Développement*, focused on improving farmers' access to quality potato seed. In total, 50.1 tons of seed were certified in 2017, resulting in yield increases of up to 80% across the 580 on-farm plots. To achieve this, the consortium placed farmers at the center of activities, building strong relationships with producer cooperatives for the rapid dissemination and adoption of the locally adapted seeds.

Groups of women consolidate their knowledge through innovative soybean products and processing in Benin.

The role of African SME in PAEPARD

The participation of private sector entities in each consortium seeking support from PAEPARD was strongly encouraged. In most cases an SME applied, rather than a large international company, probably due to the small grant and close partnership that was required with farmers. The following consortia successfully combined the interests of both SME and farmers.

Benin soybean consortium

The Benin soybean consortium aimed to co-innovate improved and sustainable technologies for the production of high quality soybean products. The main beneficiaries of the project are female processors living in six rural soybean production areas who have been trained in new processing techniques and hygiene practices. In total, 97 soybean entrepreneurs have been trained to process stabilized soy milk, which has an increased shelf life (from one day to six months), and 12 women cooperatives have received training in other processing technologies to relay to their 1,500 members. The soybean processors have reported that, with the advent of the new processing technologies, they tripled their production in just three months.

The consortium established an inventory credit system to allow women processors and wholesalers to buy soybean from the *Union Communale des Producteurs de Zogbodomey* when market prices rise, without impacting producers' income. The combination of this system and the training in new processing techniques has increased women's participation in soybean processing agribusinesses. More women are also joining the wholesale and retailing industry to strengthen the whole soybean value chain.

Engagement with the women processors in the consortium has enabled researchers to demystify and simplify scientific information so that it is user friendly and meets the women's needs. In 2016, the consortium also partnered with the African Agribusiness Incubation Network to set up a private sector organization, the Benin Agribusiness Incubation Hub (BAIH), to help turn research outputs into viable agribusinesses. Its first activity was to secure the quantity and quality of seed supply, which has been done in partnership with researchers and European donors[10].

Ghana citrus consortium

Two private sector fruit processing companies were involved in the Ghana citrus consortium, which aimed to address citrus fruit damage as a result of pests and diseases. Pinora Ltd and Fruitland Ghana Ltd, which source citrus fruit from Ghanaian farmers for processing into juice, have supported the training of farmers in the use of the pest and disease control solutions developed by the consortium. The CEO of Fruitland Ghana even participated in a three-day workshop organized by the consortium in Mankranso, in August 2014, to raise awareness of the devastating nature of angular leaf diseases on Ghana's citrus fruit industry.

In the past, there were many misunderstandings between the two, buyers and farmers because they did not have a forum for discussion. However, since the consortium established its IP, all issues have been discussed in the IP before coming to a joint agreement on questions, such as which type of fruit the farmers should harvest. Negotiations on fruit price have also been facilitated by the IP.

In addition to the processing companies, private sector agro-input importers and dealers have supplied the consortium's trained 'spraying gangs' with inputs to manage angular leaf spot disease and fruit flies. With the support of these private sector players over 3,000 citrus farmers in Ghana have adopted the GAP (Global Agricultural Practice) approved Carbendazim and Mancozeb sprays, which have been proven to control angular leaf spot disease with no harm to consumers or the environment.

Burkina Faso *Trichoderma* consortium

GIE BIOPROTECT, a (joint venture) private sector company based in Burkina Faso that specializes in the supply of organic farm inputs, as well as training and advice on organic farming and good agricultural practices, is a leading partner in the Burkina Faso consortium focused on promoting the use of *Trichoderma* enriched compost. Since participating in the consortium, GIE BIOPROTECT has invested in the training of skilled human resources (in project management, microbiology and sales); in development and transfer activities in coordination with the NGO partner, Association for Research and training in Agroecology (ARFA), and farmer groups (Téga Wendé); and in the acquisition of equipment to improve the availability of indigenous *Trichoderma* strains.

In parallel to the field trials, the company has led the coordination of the consortium and started to commercialize the production and distribution of bio-protectants and bio-fertilizers from *Trichoderma sp.* Due to its vested interest in the promotion of *Trichoderma* enriched compost, GIE BIOPROTECT has taken on a leading role in the coordination of the partnership.

Malawi aquaculture consortium

The AgriTT-funded consortium focused on identifying optimum feeding strategies and enhancing tilapia production in Malawi, and was initially supported by Malawi's leading aquaculture company, MALDECO. MALDECO was strategically engaged in the consortium to bring in aquaculture feeding and marketing lessons from the point of view of the private sector to help commercialize small-scale tilapia production in Malawi.

The company not only participated in the consortium to share its own experiences, but also to utilize research findings related to optimum feeding strategies for enhanced fish production. MALDECO contributed to the success of the initial project, *Combining Post-Harvest Fish Value Chain and Social Change Interventions in Zambia and Malawi,* supported by the Cultivate

[9] Makwenda, B. et al. 2016. Dealing with a hidden menace: Reducing aflatoxin levels in groundnuts. PAEPARD fact sheet, NASFAM. Available at: www.paepard.org

[10] NWO 2016. Matching grain quality attributes to the requirements of soybean processors in Benin. Available at: https://www.nwo.nl/en/research-and-results/research-projects/i/35/13735.html

Africa's Future Fund[11]. However, the company left the PAEPARD network in 2015 and stopped sharing information with the consortium.

Togo pepper consortium

In 1998 a women's group established a private sector company called AGROCOMPLEX to develop the pepper value chain in Togo, which provides a livelihood for almost 75,000 smallholder pepper farmers. Since then, the company has supported producers to secure supplies of raw materials, in particular, highly prized chilli pepper seeds. In response to the PAEPARD call for research proposals in 2011, AGROCOMPLEX led a consortium to help identify key challenges in the pepper value chain that research innovations could help to address.

With input from AGROCOMPLEX the consortium decided to focus research on improving smallholders' access to seeds and their capacity to breed improved pepper seeds. The company was responsible for managing the logistics and marketing of pepper seed production (e.g. collecting, sorting, packaging and distributing labelled seeds) and its participation in the consortium helped to develop an efficient business environment among consortium partners.

The role of European stakeholders in PAEPARD

PAEPARD consortia struggled to form strong partnerships with European organizations, particularly private sector companies, NGOs and farmers' organizations. From many European companies' point of view, sharing results with other stakeholders is often not in line with developing and maintaining a competitive advantage, which makes them reluctant to participate in a PPP. For private sector European stakeholders seeking quick returns on investment, the length of the research and implementation process was also highlighted as a key constraint to their participation in PAEPARD consortia[12].

Despite the limited availability of European stakeholders a few private sector European partners participated in PAEPARD consortia with the intention to develop business opportunities with African stakeholders.

West Africa mango waste consortium

The Europe-Africa-Caribbean-Pacific Liaison Committee (COLEACP) is a civil society organization whose main purpose is to support the development of a sustainable and competitive agriculture sector and create an enabling environment for agribusinesses. Its role as a partner of PAEPARD is to lead the West Africa mango consortium, which focuses on adding value to mango waste by developing alternative (non-food) products. Consultations within the COLEACP network of producers, exporters, processors and importers, confirmed that the consortium's theme should focus on mango waste. Three areas for the development of non-food value added waste products were identified: animal feed, cosmetics and energy-compost[13].

COLEACP has supported stakeholders in each of the three research areas to develop full proposals from research questions, following the multi-stakeholder ULP approach[14]. However, the absence of strong leaders to implement action plans led to the development of a new strategy based on investment from the private sector in order to progress the consortium's research.

Burkina Faso *Trichoderma* consortium

BIOPHYTECH[15], a French company focused on bio-technological and industrial research, is a key partner in the Burkina Faso *Trichoderma* consortium focused on promoting the use of *Trichoderma sp.* as an agent for biological control. In a joint venture with GIE BIOPROTECT, the company has ensured the scientific coordination of the project, specifically the transfer of technology for the production, formulation and manufacture of locally adapted *Trichoderma* strains. Before the end of the CRF mechanism, BIOPHYTECH invested in Côte d'Ivoire and Senegal to develop two more joint ventures. The company used the same approach of partnering with national research and development entities to transfer technology to local processors (SMEs) to promote the local production of indigenous *Trichoderma* strains. BIOPHYTECH invested capital, knowledge and, most importantly, helped to build the capacity of young scientists to convert them into innovative entrepreneurs.

When a farmers' organization makes business, here with low aflatoxin contaminated groundnuts in Malawi.

[11] Information available at: http://paepard.blogspot.com/2015/10/improving-fish-post-harvest-management.html

[12] Ollivier, L. and Francis, J. 2017. Appraising the participation of European partners in the PAEPARD Users-Led Process. FARA. Available at: www.paepard.org

[13] Félicité-Zulma, D. 2016. COLEACP Users Led Process. PAEPARD Fact Sheet. Available at: www.paepard.org

[14] Ibid.

[15] For more information visit: http://biophytech.fr/

The role of NGO in PAEPARD

Many NGO were associated with PAEPARD consortia, with various status and roles depending on the organizations and the consortium that they partnered with. Although each NGO represented the civil society: some were clearly focused on the promotion of entrepreneurship (SOJAGNON in Benin), while others were more focused on training and capacity building (ARFA in Burkina Faso), or extension and technology transfer (ChainUganda and Caritas in Uganda).

Benin soybean consortium

SOJAGNON is an NGO that works with farmers' and processors' associations in Benin. It promotes innovation along the agricultural food chain in general, and specifically focuses on the soybean value chain through partnership with the public and private sector.

The PAEPARD-funded CRF mechanism organized stakeholder platforms for participatory discussions and surveys, trained its members on farming and processing techniques and facilitated the marketing of soybean products. Soybean processors were identified and mobilized by SOJAGNON to assess the challenges linked to the use of traditional processing technology. The women processors expressed their constraints and were linked-up with researchers to develop appropriate and improved processing technologies and products. The NGO then helped the women to commercialize these research outputs with the creation of an incubation hub, BAIH.

SOJAGNON also developed a communication strategy for the consortium through the dissemination of informative material (flyers on soybean derived products, illustrated technical sheets on production of soybean 'cheese') and organization of promotional tools and events (local and national exhibitions and fairs, radio and TV interviews, social media). The NGO has increased the consortium's national and international exposure and recognition by facilitating relations with public authorities in Benin, the Ministries of Education and Agriculture, as well as with the European Union and various European embassies.

Burkina Faso *Trichoderma* consortium

Through pre-existing scientific relations the NGO, ARFA, is closely related to the *Trichoderma* consortium's leading partner, GIE BIOPROTECT in Burkina Faso, as well as to the French private sector partner, BIOPHYTECH. ARFA used this strategic position to bridge the gap between these private sector companies, public authorities and producers, in order to promote the production and use of *Trichoderma* compost. The NGO disseminated facts and evidence about the benefits of *Trichoderma*, led awareness raising activities and trained extension trainers to promote uptake of *Trichoderma* compost among small-scale farmers in several regions of the country.

Togo pepper consortium

The *Centre d'Action pour la Sécurité Alimentaire le Développement Durable et la Valorisation des Ressources* (CASADD-VR) is an NGO, which focuses on implementing research outcomes for development in three main areas: sustainable agriculture, environment management, and micro-entrepreneurship and fair trade. In the Togo pepper consortium, it plays a critical role in the transfer of technology and knowledge between research entities and farmer groups, in order to create value from the research results for farmers and entrepreneurs. As leader of the consortium,

CASADD-VR succeeded in empowering all of the partners to participate in their various roles.

CASADD-VR has experience in working on development projects with the same objective as PAEPARD: to support the creation of an enabling environment to foster domestic SME incubation. This experience meant that the NGO was a natural leader for the PAEPARD pepper consortium.

Uganda African indigenous vegetables consortium

The African indigenous vegetables (AIV) consortium, based in Uganda, aims to demonstrate the economic benefits of AIV cultivation in order to enhance people's health and diets through increased consumption of these nutritious vegetables. ChainUganda and Caritas, the two NGO involved in the consortium, focused on promoting the health and nutrition benefits of AIV through informative communication campaigns, awareness raising activities and consumer education.

The average daily consumption of vegetables and fruit in Uganda is about 200 g per person, which is far below the WHO-FAO recommended minimum intake of 400 g. There are many socio-cultural reasons behind this gap, and socio-economists at ChainUganda are helping the consortium to understand these issues to enable the consortium to better promote the production and consumption of AIV in Uganda.

European NGO

The *Collectif Stragégies Alimentaires* (CSA) is a Belgian NGO and member of AgriCord, the European-based global alliance of agri-agencies mandated by farmers' organizations. As a partner of PAEPARD, CSA was initially in charge of linking European NGO involved in the development of food systems and agriculture in Africa to relevant PAEPARD consortia. Instead, however, the efforts of CSA helped to strengthen the ability of African farmers' organizations involved in the consortia to address issues that cut across the chosen value chains of PAEPARD consortia. For instance, CSA helped to promote family farming in West Africa, and farmers' access to seeds in East Africa[16].

PPP means creating synergies through win-win situations, not more dependency.

The role of PPP in consortium sustainability

a) Selecting the right partners and building trust

One of the first lessons learned from PAEPARD is that successful multi-stakeholder partnerships are based on mutual trust between partners, which takes significant time to establish[17]. The creation of a sustainable PPP, therefore, must allow sufficient time for a consortium to establish and strengthen reliable human relationships among all stakeholders. The most sustainable consortia supported by PAEPARD were those initiated much earlier than the 2011 call. The stakeholders involved must also have had at least one identified and shared goal to achieve sustainable impact. Having a clear vision on how the involved partners can reach a profit level is a requirement for a PPP to grow and expand. A PPP is, therefore, first and foremost a negotiation to reach a win-win agreement among all stakeholders, which takes into account their different priorities and expectations.

[16] Collectif Stragégies Alimentaires. PAEPARD II. Available at: http://www.csa-be.org/spip.php?page=reseau&id_rubrique=14&id_mot=179

[17] Flament, J. et al. 2017. Findings from the sector and multi-stakeholder consultations conducted in the framework of PAEPARD between 2010 and 2012. FARA. Available at: www.paepard.org

Successful consortia are not only research driven, but also need sound management, financial and communication skills to excel in their field and deliver on their aims. Getting the financial revenue model of a PPP straight is essential for the creation of a sustainable and scalable business model. Private sector organizations are experienced in thinking strategically about revenue streams and business models, which makes their participation in a PPP highly valuable for the sustainability of the partnership's activities.

Another determining factor for the sustainability of research consortia is ensuring uptake of the research outcomes, which relies on the input of end-users (in this case producers or processors). By design, producer organizations are a vehicle through which farmer involvement in research and policy is strengthened and guaranteed. As institutions they go beyond the project life cycle to establishing sustainable farmer-owned and managed institutions. The PAEPARD consortia capitalized on this rich institutional structure to further producer involvement in research activities and promote uptake of technologies and innovations, which will last beyond the consortium's life.

b) Opening new funding windows and opportunities

The PAEPARD multi-stakeholder approach offered stakeholders an opportunity to meet with other willing partners for the extension of existing projects and birth of new projects. Four consortia have been able to use the seed money from the PAEPARD CRF mechanism to search for more investment to expand their activities.

The Benin soybean consortium, for example, won funding for four projects focusing on different value chains with ProSeSS[18] (soya seeds), Icowpea (cowpea), DOYIWE[19] (Kersting's groundnut) and DAPIS[20] (pineapple). One of the partners in the Malawi and Zambia groundnut consortium, FANRPAN, received supplementary funding from FAO under a project on supporting smallholder farmers in Southern Africa to better manage climate-related risks to crop production and post-harvest handling. The AIV consortium in Uganda secured more funding from the Dutch Applied Research Fund to support indigenous vegetable seed systems. Meanwhile, the *Trichoderma* consortium used the CRF money to secure additional funding from the *Agence Française de Développement (AFD)* to support biological labelling in vegetable production. The pepper consortium in Togo also secured additional funds from the Africa-Brazil Agricultural Innovation Marketplace to test new pepper varieties from Brazil.

[18] Food & Business Knowledge Platform. 2016. Towards an efficient soybean food chain in Benin (ProSeSS). Available at: http://knowledge4food.net/research-project/arf2-prosess-benin/

[19] Food & Business Knowledge Platform. 2018. Enhancing Kersting's groundnut production-marketability in Benin (Project Doyiwé). Available at: http://knowledge4food.net/research-project/benin-groundnut/

[20] Food & Business Knowledge Platform. 2016. Agronomic and processing practices for pineapple in Benin (DAPIS). Available at: http://knowledge4food.net/research-project/arf2-pineapple-benin/

[21] Aflatoxin Partnership, September 2013. Malawi Programme for Aflatoxin Control (MAPAC): Advancing Collaboration for Effective Aflatoxin Control in Malawi. Available at: http://www.aflatoxinpartnership.org/uploads/MAPAC_STDF_PPG_400_FinalReport_Sep-13_0.pdf

Small incentives, either financial or intellectual (i.e. capacity building and training) had a catalytic effect on PAEPARD consortia, motivating all stakeholders to progress with formulating new funding proposals. These incentives were decisive for the Togo pepper and Ghana citrus consortia, helping to stimulate the participation of private sector stakeholders. Likewise, the French company, BIOPHYTECH, admitted that without the CRF grant to the *Trichoderma* project, it would not have continued to invest in Africa – the company is now present in Burkina Faso, Côte d'Ivoire and Senegal.

c) Solidifying existing partnerships and generating new ones

During the course of the PAEPARD project, consortia partnerships shifted considerably. Some partnerships were strengthened, while others came to an end and new partnerships often appeared from an idea for a side project, or as the pilot began to be scaled up. The Benin soybean consortium explored a wide variety of partnerships with Dutch partners funded by NWO-WOTRO, and spread its research outputs to 17 new municipalities with support from the German development agency, GIZ. The groundnut consortium in Malawi and Zambia has gained the experience and influence to join the Malawi Programme for Aflatoxin Control[21], which seeks to create a regional dialogue on aflatoxin control.

The PPP approach seems to have given PAEPARD-supported consortia momentum to continue working together, as illustrated by GIE BIOPROTECT and BIOPHYTECH in the *Trichoderma* consortium, which both developed expansion strategies based on the evidence of two to three years of field trials. However, upscaling consortia activities was often only possible with official public policy support, which was consolidated by positive research results.

d) Patents and intellectual property

No patents have been registered yet in current PAEPARD consortia, although the Benin soya consortium is at the stage of commercializing its *'dadonu'* product (to replace bouillon stock cubes with locally produced ingredients, including soybean). However, far from being a limitation to patenting or business entrepreneurship, partnerships with public and private sector stakeholders offer opportunities to exchange and develop new innovations with partners across the world. In the Togo pepper consortium, Brazilian researchers at EMBRAPA Vegetables shared their knowledge on chilli pepper breeding with researchers at Lomé University in Togo.

The two research institutes evaluated the suitability of Brazilian pepper varieties for cultivation in Togo and disseminated the varieties best adapted to local conditions among Togolese farmers.

The use of local resources and knowledge (such as indigenous *Trichoderma* strains in Burkina Faso or Solanaceae species in Uganda) contributed to the establishment of smooth legal and business partnerships in the *Trichoderma* consortium and AIV consortium.

It was only in the case of the Ghana citrus consortium that a biological solution patented by a private company prevented the University of South Africa from sharing the solution with the University of Ghana to test whether it could help control angular leaf spot disease. Further problems related to intellectual property rights may appear later with the scaling of each pilot project (e.g. *'dadonu'* in Benin), as market demand for the research innovations begins to grow and fierce competition emerges; hence the importance that consortia are built on strong foundations of trust.

Lessons and recommendations

The PAEPARD consortia's experience of working as part of a public-private partnership has guided the following lessons and recommendations:

- Collaboration with stakeholders from different sectors enables consortia to address cross-cutting issues and pool their resources and expertise to increase the chance of success. Using a PPP approach increases the chances of achieving tangible impact, as the public sector will create an enabling environment for disseminating the duly tested innovation, and the private sector will drive the project to respond to market demand and begin generating profit.
- The differing ideologies of public and private stakeholders must be taken into account when setting out the partnership's aims. All partners need to have some shared interests in order to motivate them to deliver on the project objectives.
- The establishment of clear communication channels between partners is essential for strengthening a PPP and ensuring efficient transfer of knowledge and lessons. This includes face-to-face meetings, as well as virtual interactions (e.g. via social media).
- PPP enable information exchange and the establishment of new professional relationships, aimed at developing new businesses, structures or policies. Developing strong relationships with local stakeholders (processors, retailers, developers or bankers), which are maintained after the project funding has come to an end, will ensure the sustainability of project activities.
- The organization of workshops to validate research outputs with processors enables researchers to refine their innovations in order to meet the beneficiaries' needs.
- The inclusion of producers and producer organizations is essential to ensure that the consortia respond to end-users' needs and the research outcomes are adopted by the intended beneficiaries.
- Participation in a PPP develops stakeholders' negotiation and facilitation skills. Promoting PPP formation, therefore, helps to strengthen capacities as well as widen funding opportunities.
- The opportunity to develop new skills and gain experience in PPP, as well as financial incentives, helped to motivate private sector participation in PAEPARD consortia. Private sector European stakeholders are more interested in joining a PPP when they can see opportunities to develop new business in Africa. However, a major constraint to European stakeholders' engagement was and remains the lack of funding.
- When a PPP finds a way to commercialize its activities, stakeholders will be able to recover costs incurred during the inception and implementation period, and support further innovation investments.

Multiple innovation in Benin involved multiple stakeholders to meet market needs, here African condiments made of soybean.

Conclusion

The PPP approach designed and experimented by PAEPARD offered great value for the improvement of ARD in multiple ways. One of the main benefits of forming multi-stakeholder partnerships proved to be the ability to pool resources together and achieve more impactful results. The participation of both public and private sector partners also helped to increase consortia capacities to manage partnerships and source funds. All PAEPARD participants agreed that the PPP model was a success and the ULP was effective in achieving consortia goals through research and innovation. Each partner had a stake in the consortia and was committed to delivering on project objectives. The multi-disciplinary teams led to a better understanding of the challenges and opportunities across the field and hence facilitated stakeholders' commitment to future projects.

All participants found PPP effective in achieving consortium goals through innovation

Working alongside grassroots farmer organizations, SMEs and NGOs has allowed PAEPARD to gather in-depth experience of what stakeholders need, and to provide crucial evidence for policy makers. PAEPARD thus provides evidence that PPPs are critical for successful agricultural interventions and that such partnerships enable agricultural development projects to achieve sustainable success more frequently than when individual entities work alone. However, a program to bring multi-stakeholder research consortia to scale, beyond the pilot phase, still needs to be experienced after PAEPARD.

PAEPARD

The Platform for Africa-Europe Partnership in Agricultural Research for Development (**PAEPARD**) is a an eight-year project sponsored by the European Commission (80%) and partners' own contributions (20%). It has been coordinated by the Forum for Agricultural Research in Africa (**FARA**) since December 2009, and was extended until end of 2018.

It aims at building joint African-European multi-stakeholder partnerships in agricultural research for development (**ARD**) contributing to achieving the Sustainable Development Goals. On the European side, the partners are **AGRINATURA** (The European Alliance on Agriculture Knowledge for Development, coordinating the European partners), **COLEACP** (representing the private sector), **CSA** (representing the NGOs), **ICRA**, specialized in capacity building in ARD, and **CTA** (the Technical Centre for Agricultural and Rural Cooperation). On the African side and in addition to FARA, the partners are the Pan-African Farmers Organization (**PAFO**), the Regional Universities Forum for Capacity Building in Agriculture (**RUFORUM**), and the Food, Agriculture and Natural Resources Policy Analysis Network (**FANRPAN)**. PAFO involves its members which are the Eastern Africa Farmers Federation (**EAFF**) based in Nairobi, the Réseaux des Organisations Paysannes et des Producteurs d'Afrique de l'Ouest (**ROPPA**) based in Ouagadougou, and the Plate-forme Régionale des Organisations Paysannes d'Afrique Centrale (**PROPAC**) based in Yaoundé. The Southern African Confederation of Agricultural Unions (**SACAU**) is an associate partner of **PAEPARD**.

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