THEMATIC NOTE 2

Building and Strengthening Public-Private Partnerships in Agricultural Research

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SYNOPSIS

Often the challenges of developing country agriculture can be met only by pooling the limited public and private resources available and unleashing innovative potential out of critical interaction. Investments that support the building and conduct of research partnerships can lead to more substantial and viable research that fosters social and development needs while not getting overshadowed by private interests. Before providing financial support to public-private partnerships, public and development agencies must determine whether the partners' interests and objectives are sufficiently mutual and whether the partnership will generate synergies from joint use of knowledge and resources. If these conditions are met, brokering a partnership arrangement is a powerful means to foster agricultural research.

RATIONALE FOR INVESTING IN PUBLIC-PRIVATE RESEARCH PARTNERSHIPS

The innovation system approach extends the conventional argument for public investments in agricultural research[1] by saying that a single organization, be it private or public, may not be able to assemble the necessary resources, capacities, and knowledge to generate and diffuse innovations. (See also module 5, TN 1.) The increasingly blurred roles of the public and private sectors in agricultural research can be seen in the rise of public-private partnerships (PPPs). The two sectors are redefining their traditional division of labor as their overlapping interests and the benefits of combining resources lead both of them to engage in both types of research (Hall et al. 2001; Hartwich and Negro 2010; Muraguri 2010). Some of the implications of this mixed panorama in agricultural research are summarized in box 4.10.

In PPPs, at least one public and one private organization share resources, knowledge, and risks to achieve a match of interests and jointly deliver products and services.[2] In agricultural research, PPPs can be seen as arrangements that bring together partners with different skills and knowledge to contribute jointly to the generation, adaptation, and/or diffusion of an innovation. Usually the partnership agreement is in the form of a contract that establishes each partner's commitments and the distribution of benefits.

PPPs in agricultural research can be set up not only to generate knowledge via research but to foster the diffusion and application of knowledge among private actors (agribusinesses, farmers) as well as public actors (universities, research institutes, and extension agencies). In this respect, PPPs can be distinguished by their contributions to the research-development continuum (table 4.3). Some partnerships also engage in a mix of types of research and development; research-based activities precede the stage of product development.

PPPs can be distinguished further according to the partners engaged. Common partners are research institutes, universities, extension agencies in the public sector, and producer associations, businesses, and individual producers in the private sector. Many partnerships involve a public research organization that has the main responsibility for conducting the research, but in others a private entity conducts the research and public agencies diffuse and/or fund the research. Other types of organizations engaged in partnerships include farmer and community groups, private associations, investment and sector development promotion bodies, and funding agencies. Often more than two parties are engaged; depending on the leading partner one can distinguish PPPs led by private enterprises, research institutes and universities, government (ministries), and so on. For an example of PPPs among public research organizations, the private sector, and farmer organizations, see module 5, IAP 2.

Box 4.10 Public-Private Partnerships and the Changing Roles of Public and Private Agents in Agricultural Research

- ***PPPs are more than an organizational solution*** between market and hierarchy; they are arrangements that maximize benefits by using the creativity and synergy of collective action to respond simultaneously to public and private needs.
- ***Public-private partnerships (PPPs) generate social benefits*** in the way that they leverage resources from the private sector and combine them with public resources. In this way, additional resources and capacities become available to address pressing research issues.
- ***PPPs can be instrumental in increasing the overall volume of agricultural research,*** although developing countries may not replace public funds substituted by private funds (and match levels of private investment in more developed countries).
- ***To develop and improve their image*** in line with public goals and respond to corporate responsibility criteria, private companies will partner with the public sector. Corporate social responsibility alone is not a good motivation for PPPs that want to promote sustainable businesses, however.
- ***It is simplistic to reduce the private sector's interest in agricultural research*** to the development of private goods that can be protected by IPRs. In fact, private partners in only a small fraction of 124 PPPs in agricultural and agro-industrial research in Latin America were interested in protecting property rights; the few examples occurred only in seed companies. Apparently private companies benefit more from the synergistic use of resources than from protecting the IP of research results.

Source: Hartwich and Tola 2007.

Table 4.3 Types of Research Subject to Public-Private Partnerships

Type of research	Example
Creative research partnerships that generate and explore new scientific finding	Biotechnological exploration of compounds in pharmaceutical plants
Applied research partnerships that use an existing research methodology to generate new solutions	Development of a plant variety that resists a new pathogen
Development-oriented research partnerships that focus on the development of products	Development of a new potato chip
Diffusion-oriented partnerships that promote the dissemination of developed knowledge and technology	A seed multiplication program supporting dissemination of a particular plant variety

Source: Author.

INVESTMENT OPTIONS FOR SUPPORTING PUBLIC-PRIVATE RESEARCH PARTNERSHIPS

PPPs become interesting subjects for investment in two ways. First, they constitute product development mechanisms that foster collaboration for innovation that otherwise would not occur. For example, a private company and a public research institute may not collaborate in the development and diffusion of a new pest-management technology simply because they are not informed about their common interest and complementary capacities. In fact, potential partners from the public and private sector often fail to collaborate because each lacks knowledge about the other sector and the potential benefits of a partnership. A funding agency could improve information flows by financing meetings and a platform where these players can start interacting and identify common interests to develop a common work agenda.

Second, PPPs constitute funding mechanisms in their own right that enable a funding agency to engage with actors in agricultural innovation, particularly the private sector. (See also IAP 2 and module 5, TN 2 and IAP 2.) For example, a development agency or donor can use a PPP to support the efforts of an international agribusiness specializing in dairy products to work with small-scale dairy producers who initially lack the capacity to participate in the dairy value chain. The funding agency would ensure that activities under the partnership would also generate social benefits, particularly for the small-scale producers.

Quite a number of PPPs have been set up over the past ten or more years in developing country agriculture (Hartwich and Tola 2007; Spielman and Hartwich 2009). In many cases the public and private organizations involved

found that partnering in research is to their benefit. Examples include partnerships where research reduces the costs of processing primary products, partnerships that improved product quality to access higher-value markets, or partnerships to exchange planting material and outsource seed multiplication to the private sector (boxes 4.11, 4.12, and 4.13.)

The failure of PPPs to fulfill their potential provides the context for a range of public investment opportunities to build and improve PPPs for agricultural research. But in which PPPs should development agents invest? In general, a precondition for investment in PPPs in agricultural research is that they should count on financial support from government and development agencies; they should address problems of public concern that require collective action; and they should pool capacities for innovation. Specific investment opportunities include:

- ***Investments in bringing partners together*—**specifically, in identifying partners, their common interests, available resources and competencies, and potential synergies. One option is to invest in the organization of platforms that allow public and private organizations interested in developing and adopting agricultural innovations to meet, exchange information, and develop joint projects. Often a neutral broker is needed to facilitate the platform; see module 1 and module 3, TN 4 for examples.
- ***Investments in fostering better planning.*** Investments can support the design of partnerships that facilitate efficient work and fair distribution of benefits within the partnership framework.
- ***Investments to partly fund the operation of the partnership, complementing the public contribution.*** An example of such investments is a fund that provides grants to research projects conducted in partnership between various organizations. (See also IAP 2 on NAIP in this module and TNs 1 and 2 on PPPs and innovation funds in module 5.) The fund's contribution to the partnership usually depends, among other considerations, on the partnership's ability to respond to certain public interests.
- ***Investments to set clear legal rules and framework conditions for partnering.*** Many public institutions still lack clear rules to determine when and how they can work with the private sector; in the end, individual initiatives determine whether partnerships are set up. Many research institutes leave it to their legal departments to screen and approve collaborative research projects.
- ***Investments in coaching partners to ensure that public and private benefits reach the partners and society.*** Often it is not enough to help organizations to set up a promising partnership. During the partnership, conflicts may arise, partners fail to comply with promises, and certain framework conditions can change. Support during the partnership (for example, through a partner-

Box 4.11 Public-Private Partnership for Participatory Research in Potato Production in Ecuador

An international potato chip producer operating in Ecuador could not procure enough potatoes of suitable quality to use all of its local processing capacity. The company tried to provide incentives to farmers through contract farming and higher prices, with unsatisfactory results. The company finally determined that on its own it could not persuade small-scale farmers to deliver more and higher-quality potatoes. It partnered with the National Agricultural Research Institute (INIAP, Instituto Nacional Autónomo de Investigaciones Agropecuarias) to focus on identifying, developing, and distributing potato varieties with the required processing qualities. The partnership had an extension component in which INIAP helped farmers adopt the new varieties, grow them with appropriate management practices, and increase productivity and output.

After some months of negotiation, the partnership was set up and a formal agreement signed. INIAP provided research and extension capacities while the private company provided funding. A national research fund contributed additional public funds. The partnership ended after some years because the company had achieved its objectives.

Factors that enabled the partnership to succeed included a good match of interests (INIAP sought to support small-scale farmers, from whom the company wanted to buy quality potatoes). The partners' competencies were also well matched: INIAP was expert in developing and disseminating improved potato varieties, and the company had expertise in evaluating the cost-reduction and product-improvement potential of the potato varieties.

Source: Author.

Box 4.12 Public-Private Partnership for Processing Cashew Nuts in Northern Brazil

In the late 1990s, Brazil's cashew nut sector was in ruins. Competition and price variation on the world market, along with poor product quality and mismanagement, caused the processing industry to go bankrupt, taking a large number of small-scale producers with it. Producers' crop remained without buyers, and they had few alternatives to cashew production.

Brazil's national agricultural research institute, EMBRAPA, partnered with a cashew-exporting company and a number of organizations of small-scale growers to develop and diffuse microprocessing units for cashews that would be owned and managed by the grower organizations. Researchers adapted large-scale processing technology to develop much smaller processing units they called "minifactories" (*minifabricas*). The export company provided knowledge of market demand, product quality, and processing requirements, as well as some quite limited funding for training farmers. EMPRAPA covered the main costs of the partnership, which involved laboratory research and on-site testing of growers' processing units.

EMBRAPA constantly exchanged information with growers and the exporter about the appropriateness and readiness of the technology. Growers slowly became familiar with the technology and started to adapt it to their own needs. Eventually farmers gained substantial capacity in cashew processing and the commodity was once again, through the exporting partners and soon through competing exporters, sold internationally. Farmer incomes benefited significantly as farmers regained a market for their primary product and profited from the value added by their primary processing units. The exporting company also increased its profits, which benefitted employees and shareholders. The partnership succeeded because EMBRAPA's advance project identification and planning were good, the market for cashews remained strong, and EMBRAPA and the exporting company had complementary knowledge and skills (processing technology in EMPRAPA and market information in the exporting company).

Source: Author.
Note: EMBRAPA = Empresa Brasileira de Pesquisa Agropecuária.

Box 4.13 Public-Private Partnership for Research on New Wheat Varieties in Argentina

A private European company specializing in wheat, sorghum, and maize seed wanted to benefit from Argentina's rapidly expanding market for cereal seed but knew little of Argentina's wheat breeding program over the years. For example, it did not know which specific resistance and tolerance traits had been introduced (and failed) and which varieties, lines, and breeding strategies had been used to raise wheat yields. The national agricultural research institute (INTA, Instituto Nacional de Tecnología Agropecuaria), partly funded through a levy on the agricultural sector, had downsized its wheat breeding program and was looking for a partner with whom it could exchange information and genetic material. It was also interested multiplying certain varieties that it had developed but not tested, released, or multiplied. The two organizations entered a partnership that envisioned the exchange of certain genetic materials to develop and multiply seed of new varieties. The IP for the resulting varieties would remain with the public sector, but the seed company would benefit from seed sales and pay royalties to the public institute. The partnership was phased out after a number of years and the company (among others) now caters to a well-established market for wheat seed. Factors that contributed to the partnership's success included their complementary skills (INTA's excellence in wheat breeding and the company's advantages in seed multiplication and marketing).

Source: Author.

ship support unit) may be useful. The unit could also help partners set up an efficient system for monitoring and evaluating the partnership. For example, CIAT's partnership development and facilitation unit has played this role.

POTENTIAL BENEFITS OF INVESTING IN PUBLIC-PRIVATE RESEARCH PARTNERSHIPS

For a number of important reasons, public and private organizations participate in research partnerships and governments encourage them to do so. First, supporting PPPs in agricultural research provides an opportunity to improve the performance of agricultural research operations. Research partnerships can also broaden the scope of research activities, increase efficiency and synergy, access complementary resources, and promote organizational learning among the partners (Hagedoorn, Link, and Vonortas 2000). The potential benefits from funding measures that initiate PPPs and help them operate successfully can include:

- ***Better use of existing research capacity*** by allowing public and private partners to form and draw from a greater critical mass of scientific capacity.
- ***The research process becomes more creative*** when allowing public and private partners to join complementary competencies.
- ***Agricultural research productivity and results improve*** when public and private partners develop synergies through the combined use of resources.
- ***Cost-efficiency in agricultural research improves*** when public and private partners share costs and benefit from more efficient private sector management practices.
- ***Research results can arrive more quickly*** owing to the private partner's drive for more immediate results.
- ***Investments in agricultural research for social benefits increase*** by identifying compatible private and public interests and combining private and public sources of funding.

Boxes 4.11 and 4.12 illustrate how the efficient collaboration of public and private agents in the Ecuadorian potato industry and the Brazilian cashew nut industry yielded some of these benefits.

It is important to note that these are *potential* benefits. They will be achieved only if a number of conditions are met. In certain situations partnerships may even "block competition" and "create monopolies" (Hagedoorn, Link, and Vonortas 2000:568). In others, particularly in small developing countries, partnerships may be instrumental in bringing together the scarce but necessary research resources.

Aside from potential benefits, potential risks exist. Risks related to uncertainty and failure are inherent in any research endeavor, but every partnership also carries a risk that the partners may not contribute to the partnership as initially negotiated. Partnership agreements may not be met for any number of reasons, including changes in the market and business environment for which the partnership's products are geared. The legal and government framework may prove too inflexible for the partnership to progress, or the framework can change to prevent the public partner from fulfilling its commitment. Finally, the relationship between the partners can run into difficulties because of misunderstandings, a clash of cultures, and distrust. For this very reason, partnerships often benefit from investments in building trust, brokering, and partnership development—both initially and indeed throughout the partnership.

(POLICY) ISSUES OF OUTSOURCING, SUSTAINABLE FUNDING, AND PUBLIC GOODS

Governments often use PPPs to *outsource* service provision to private companies (improving service provision through "bringing in private sector efficiency"). In agricultural research in developing countries, where research capacity is insufficient both in the public and private sectors, outsourcing is hardly relevant. Instead PPPs aim to maintain public research facilities and strengthen them with contributions from and collaboration with the private sector to attain *a critical mass* in research.

Partnerships must not persist over time. They are agreements that help partners reach an end but they are not an end in themselves. *Sustainability over the duration of the PPP* depends on the partnership's capacity to cover the related costs of human resources, infrastructure, and equipment as well as operations, which in itself is positively related to the negotiations and the setting of binding contractual relationships at the start. More than other contractual relationships, however, partnerships are prone to financial risks. If one partner loses interest, changes the strategic focus, or becomes insolvent, the partnership will lose part of the anticipated contributions despite any prior commitments.

Core funding is a prerequisite for PPPs established in the public interest. Competitive grants that require public and

private collaboration (or vice versa) are one instrument to develop PPPs. Evidence from competitive grant schemes for agricultural research in Latin America indicates that without a solid core budget, public organizations cannot enter such partnerships from a sufficiently strong position to negotiate an agreement that reflects their interests (Echeverría 1998a).

LESSONS LEARNED

Despite the numbers of successful PPPs, the concept is still under development. In many situations PPPs fail to meet their potential to improve agriculture and rural livelihoods in developing countries, for two reasons. First, the number of PPPs is still very low and cannot match the opportunities to conduct research and develop innovations by means of PPPs. Second, many efforts to build partnerships among public research organizations and the private sector fail to bring sufficient benefits to both partners; usually one partner profits at the expense of the other (Hartwich and Tola 2007). Nor do most PPPs use their complementary resources effectively to produce substantial social benefits. Planning can be weak. Prior to initiating their partnership, partners do not engage in the necessary negotiations to clarify their common interests, each partner's commitments, and the redistribution of benefits. Usually these partnerships collapse as soon as resources become scarce and/or accrued benefits are not shared equally.

Experience on the best strategies for supporting collaborative agricultural research and PPPs is mixed (Hall 2006). Specialists in plant breeding and biotechnology research stress the value of strengthening public institutions' awareness of and capacity to manage IPRs (Lewis 2000; Byerlee and Fischer 2002). Other analysts emphasize the importance of negotiating not only IP issues but other aspects of benefit sharing and resource commitment (Rausser, Simon, and Ameden 2000; Vieira and Hartwich 2002; Hall et al. 2003). The following sections discuss some of the most important lessons from various studies and experiences.

Public-private partnerships as funding opportunities

PPPs are a mechanism through which funding agencies can build collaborative research as well as an arrangement into which they can inject public funds. In a partnership to develop wheat varieties such as the one in Argentina described in box 4.13, public research funds (for example, a competitive grant) would support the partnership financially while ensuring that social benefits are met.

Partnering may not always be the best option

Public research organizations and development funding agencies that seek to support partnerships need to separate the wheat from the chaff. Promoting and financing partnerships simply for their own sake is not useful. Partnerships may not produce good results, and in many situations another solution is more appropriate. For example, a public research agency may consider contracting the services of a private laboratory. A private company may prefer to set up its own research unit rather than collaborate with public researchers.

Motivation matters

Governments and funding agencies that want to support partnerships need to assess prospective partners' motivations for entering a partnership. According to Spielman and Hartwich (2009), one can distinguish between:

- ***Representational partnerships,*** in which one partner joins the partnership for prestige without contributing knowledge and/or resources.
- ***Outsourcing partnerships,*** in which one partner seeks to outsource research and diffusion activities to another.

Box 4.14 Indicators for Evaluating Public-Private Partnerships in Agricultural Research

- Costs of interaction among the partners, including time for negotiation as well as cost of communication and monitoring compliance.
- Contribution of each partner to the partnership in terms of human resources and expenditure.
- Strengths, weaknesses, opportunities, and threats of the partnership as perceived by partners, beneficiaries, and other stakeholders.
- Mapping of communication and information flows among individuals in the partnership.
- Anecdotal information on the history and functioning of the partnership as perceived by partners, beneficiaries, and other stakeholders.
- Joint authorship of publications by partners.
- Attribution of patents and user rights.
- Intensity of use of research results by each of the partners.

Source: Author.

- ***Competency-led partnerships,*** in which one partner is trying to tap into the competencies of another.
- ***Finance partnerships,*** in which one partner aims to secure complementary funding.
- ***Co-innovation partnerships,*** in which one or both partners try to reach a critical mass in research and synergy in developing innovations.

This last type of partnership, with its focus on adding value through collaboration, is the partnership in which public development agencies will mostly want to invest.

Importance of brokers

Evidence from Latin America indicates that PPP-promoting agents, acting as brokers in the public interest, play a crucial role in building partnerships, particularly to motivate potential partners, build trust among them, and provide credibility to partnership initiatives (Hartwich et al. 2007). Gradually, as common interests are identified and partnerships are formalized, the roles and contributions of partners need to be negotiated to ensure that partnership arrangements are in alignment with partners' interests, their capacities, and the prevailing technological and market opportunities.

Lack of planning

Through inappropriate planning and management, PPPs often fail to use their complementary resources effectively and benefit both the public and the private sector. It helps to develop a clear contract specifying the resources each partner will commit over the project period as well as the use of the research results, including IPRs and payment of royalties (boxes 4.12, 4.13). It can also be useful to strengthen partners' capacities in negotiating partnerships as well as in planning and implementing activities under partnership agreements.

As noted, for many PPPs, *protection of IP is not always a priority.* IPRs often are of minor or no concern to the private partners, who are interested instead in public sector support to obtain primary materials for newly developed and/or quality products and eventually market them to consumers. Research on new varieties may be the exception here. In the partnership described in box 4.13, any varieties developed remained public goods, and the seed company had to pay royalties on sales of those varieties. The main aim of the seed company was to market very good varieties (which it could not develop on its own) to complement its existing product portfolio. (See module 6, TN 3 on IPR and module 5, TN 5 on technology transfer offices.)

Learning and evaluation

M&E is a particular challenge in partnerships. Many criteria can be used to evaluate the outcomes and impacts of agricultural research, but evaluating collaborative processes is different and onerous for several reasons. First, partnerships can involve multiple and heterogeneous partners and stakeholders with different goals. Second, it is difficult to monitor the joint use of knowledge and other resources by partners. Third, partnerships change over time and in response to internal and external conditions. Finally, there is the inherent difficulty in attributing benefits to the collaboration itself and not to partners' individual activities (de Bruijn and van der Voort n.d.). A unified framework for the evaluation of research partnerships does not exist, and little progress on this issue has been reported in the literature (Hagedoorn, Link, and Vonortas 2000; Serafin, Bustamante, and Schramm 2008). Box 4.14 lists some indicators that, despite these difficulties, may help in monitoring and evaluating the success of collaborative research processes.

RECOMMENDATIONS TO BUILD SUPPORT FOR PUBLIC-PRIVATE RESEARCH PARTNERSHIPS

Public funding agencies that want to invest in PPPs should consider five minimum conditions that must be met beforehand (Hartwich et al. 2008):

- The existence of a common interest which, during initial negotiations, needs to be agreed upon by the partners. For example, setting up a partnership for developing a new pesticide could unleash substantial synergies among the partners, but the pesticide itself could be so harmful to people and the environment that public involvement could not be justified.
- Each partner must show a clear commitment that goes beyond shared interest. Commitments must come in the form of time and resources allocated to the partnership.
- The individual benefits of each of the partners must outweigh their individual costs; otherwise partners have no incentive to engage in the partnership.
- Benefits must be distributed proportionally. One partner cannot reap a large share of the benefits while the other receives only a marginal payoff.
- Overall benefits must outweigh overall costs. Without this synergy, there is no justification to engage in any partnership. The costs of collaborating would outweigh the benefits, and for one of the partners it would be better to pursue the goal alone. This last condition puts

PPPs in the context of innovation systems, suggesting that mechanisms of collective action, joint learning, and complementary use of resources are all operational in the development and diffusion of innovation.

In conclusion, investing in PPPs makes sense where there is agreement on objectives, strong commitments, some added value through partnering, and a fair distribution of benefits. PPPs that are badly designed, fragile, and/or result in a public subsidy to private organizations do not represent value for public investment. Partnerships should also have a limited time period. Funding agencies should particularly exclude from funding any partnerships that evolve spontaneously in the search of funding opportunities or prestige.

A public funding agency may find few of these partnerships in place, however, and could consider helping to build adequate partnerships. If after a period of support and brokerage a PPP shows signs of complying with the criteria just mentioned, it can be considered for further funding.

Finally, any PPP that is up and running can benefit from continuous support to its management that helps sustain it until the end. Given the complex relations prevalent in partnerships, tension is to be expected, and a funding agency should consider the support for partnership management as a promising opportunity.