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Public–Private Partnerships in International Agricultural Research

Introduction

Public–private partnerships (PPPs) in agricultural research and development are increasingly viewed as an effective means of conducting advanced research, developing new technologies, and deploying new products for the benefit of small-scale, resource-poor farmers and other marginalized groups in developing countries. There are, however, few studies that empirically establish whether PPPs fulfill this role in the context of developing-country agriculture.

This brief presents the results of a study that examines how PPPs in agricultural research stimulate greater investment in pro-poor innovation in developing-country agriculture. The brief provides policymakers, research managers, and business decisionmakers with a better understanding of how such partnerships operate, what types of challenges they face, and how their operation can be improved to make a greater contribution to food security and poverty reduction.

David J. Spielman

Frank Hartwich

Klaus von Grebmer

We define a PPP as any research collaboration between public- and private-sector entities in which partners jointly plan and execute activities with a view to accomplishing agreed-upon objectives while sharing the costs, risks, and benefits incurred in the process. We examine three specific issues with respect to PPPs: (1) whether these partnerships contribute to reducing the costs of research, (2) whether they promote innovative research, and (3) whether they enhance the impact of research on smallholders and other marginalized groups.

The study examines 75 projects undertaken by the research centers and programs of the Consultative Group on

International Agricultural Research (CGIAR) in partnership with various types of private firms that operate on the national, regional, and international level (Boxes 1 and 2).¹

Reducing Costs through Partnership

The study first asks whether PPPs reduce the costs of research. Conceptually, PPPs are often considered to improve the management of scarce resources by capitalizing on economies of scale and scope in research, exploiting complementary resources and capacities across the public and private sectors, and reducing transaction costs in the exchange of knowledge and

¹ Data for this study were obtained during the first half of 2006 and were drawn from an analysis of documents, semistructured interviews with key informants, and a survey of CGIAR centers. For details, please see IFPRI Discussion Paper No. 708, *Sharing Science, Building Bridges, and Enhancing Impact: Public–Private Partnerships in the CGIAR*, at www.ifpri.org/pubs/dp/ifpridp00708.asp.

Box I PPPs in the CGIAR: An Overview of Findings

Although the conventional definition of PPPs reflects the importance of joint planning, joint execution, and the sharing of costs, risks, and benefits, this definition is occasionally too narrow to capture the richness of experience gained from other types of public–private interactions in the CGIAR. Hence, we expand the definition of a PPP to include any type of formal or informal arrangement between public- and private-sector entities, such as a knowledge-sharing network, technology financing, or subcontracted research.

Findings suggest that PPPs in the CGIAR are serving a wide variety of research objectives, ranging from the system’s traditional emphasis on increasing food security by increasing yield and output to new pathways through which to reduce poverty, such as value-chain development. This trend further

suggests that research centers are widening their focus from research for technological innovation to innovation at both a systemic/societal level and an internal/organizational level. Implicit in this shift is a greater awareness of the demand for research derived from markets for both food-staple and high-value agricultural commodities.

The study identified 75 PPPs in the CGIAR that were active in 2004 or later. Of these, 47 partnerships (63 percent) are concentrated in four of the CGIAR’s larger or older commodity centers: the International Rice Research Institute (IRRI), the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the International Center for Tropical Agriculture (CIAT), and the International Maize and Wheat Improvement Center (CIMMYT) (Table A).

Table A Distribution of public–private partnerships in the CGIAR, by center, since 2004

Center	Number	Share of total
International Rice Research Institute (IRRI)	17	23
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)	11	15
International Center for Tropical Agriculture (CIAT)	10	13
International Maize and Wheat Improvement Center (CIMMYT)	9	12
Bioversity International ^a	8	11
International Center for Agricultural Research in the Dry Areas (ICARDA)	6	8
International Institute of Tropical Agriculture (IITA)	5	7
International Livestock Research Institute (ILRI)	4	5
International Water Management Institute (IWMI)	3	4
World Agroforestry Centre (ICRAF)	3	4
International Potato Center (CIP)	1	1
International Food Policy Research Institute (IFPRI)	1	1
Africa Rice Center (WARDA)	1	1
WorldFish Center	0	0
Center for International Forestry Research (CIFOR)	0	0
Total	75	100

Source: Authors.

Notes: A total of 75 partnerships were identified through the survey and other sources; 4 of these are multicenter partnerships. CIFOR, IITA, and the World Agroforestry Centre did not provide survey responses. For CIFOR, information on public–private partnerships could not be obtained by any method; for IITA, information was obtained through document analysis; for the World Agroforestry Centre, information was obtained through document analysis and key informant interviews.

^a Formerly the International Plant Genetic Resources Institute (IPGRI).

Details of these PPP projects are available in a searchable online database at <http://ifpri.catalog.cgiar.org/pppdbase.htm>, with accompanying analysis presented in IFPRI Discussion Paper No. 708, *Sharing Science, Building Bridges, and Enhancing Impact: Public-Private Partnerships in the CGIAR*, <http://www.ifpri.org/pubs/dp/ifpridp00708.asp>.

technology. Findings from this study suggest that research centers leverage PPPs to pursue several types of cost-reduction strategies, including the following:

- *Outsourcing research activities.* Of the 75 surveyed PPPs in the CGIAR, 5 (7 percent) are collaborations in which centers subcontract research tasks to lower-cost providers in the private sector. Examples include several International Rice Research Institute (IRRI) projects designed to improve access to research conducted by IRRI through various software applications.
- *Securing alternative financing.* Nine (12 percent) of the surveyed PPPs are designed to raise funds from private firms or from charitable foundations associated with the private sector. Examples include several projects of the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) supported by the Monsanto Fund, the Barwale Foundation, and the Sir Ratan Tata Trust; and an International Maize and Wheat Improvement Center (CIMMYT) project supported by the Syngenta Foundation for Sustainable Agriculture.
- *Making the prohibitive possible.* Twenty-nine (39 percent) of the surveyed PPPs are designed to help public research organizations overcome the prohibitive costs of conducting research or deploying products independently. Through these types of PPPs, public research centers leverage valuable private resources, expertise, or marketing networks that they otherwise lack. Examples include several ICRISAT and CIMMYT projects designed to commercialize improved crop varieties.

Findings from the study also suggest that firms—particularly small, domestic firms in developing countries—leverage PPPs to secure an edge over their competitors or to carve out their own niche in an emerging market. This is particularly the case with local seed firms when PPPs provide access to research centers’ improved breeding materials, which can expand a firm’s product lines and the opportunities to realize profits over relatively short time horizons.

But while these cost reductions make partnerships an attractive strategy for both the public and private sectors, findings also suggest that the hidden costs of PPPs are not insignificant. Though difficult to quantify, the transaction costs incurred in searching for appropriate partners, maintaining partner commitment, and resolving conflicts among partners are often nontrivial.

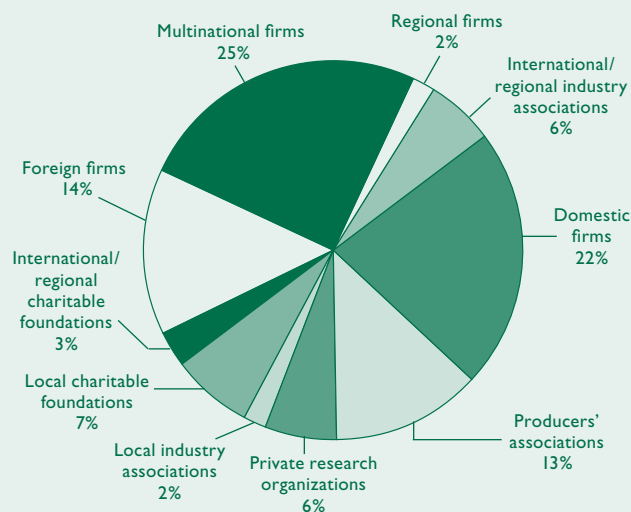
Promoting Innovation through Partnership

Apart from reducing research costs, PPPs are also designed to promote innovation—to transform knowledge and technology into an application of social or economic relevance. Thus, we ask whether PPPs promote the creation of new knowledge or

Box 2 Who Partners with Whom, and How?

Additional findings from this study show that 43 of the partnerships (57 percent) are collaborations that involve foreign entities, a category that includes foreign (industrialized-country) firms, multinational firms, or international/regional industry associations and charitable foundations. An equal number and proportion of partnerships are collaborations that include domestic entities, that is, developing-country firms, private research organizations, producer associations, and local industry associations and charitable foundations (Figure A).

Figure A Private-sector partners in the CGIAR system, by type



Source: Authors.

The overlap between these two categories is relatively small: only 4 partnerships engage both foreign and domestic entities (5 percent). Moreover, only 30 PPPs (40 percent) engaged public-sector partners, either foreign or domestic. Only 18 PPPs (24 percent) engaged national agricultural research organizations in developing countries, organizations that represent the CGIAR’s traditional partners.

Findings further show that a high proportion of PPPs in the CGIAR are exclusive collaborations. A total of 45 partnerships (60 percent of the total) involve exclusive relationships with the private sector that do not involve other public-sector or civil-society organizations. Further, 32 of these exclusive partnerships (43 percent of the total) are also “monogamous,” meaning they involve just one center and one private-sector partner.

Of these monogamous PPPs, 21 involve foreign entities (66 percent), and, of those, multinational firms accounted for slightly less than half (9 partnerships, or 12 percent of the total). The remaining 11 PPPs (34 percent) are collaborations with domestic entities. Relatedly, exclusive PPPs with foreign entities tended to be smaller (three partners on average) than PPPs with domestic entities or a combination of foreign and domestic entities (six partners on average).

Table 1 Public–private partnerships with the “Big 10s” in the crop-science and agrifood sectors, c. 2004

Sector/firm/country of headquarters ^a	Sales (million U.S. dollars)	Number of partnerships with CGIAR centers ^b	Center
Crop-science sector			
Syngenta, Switzerland	7,270	7	CIMMYT, ICRISAT, Bioversity International, and IRRI
Pioneer Hi-Bred International, United States	4,830	5	CIMMYT, ICRISAT, and Bioversity International
Bayer Crop-Science, Germany	7,390	4	ICARDA, IFPRI, IRRI, and ICRISAT
Monsanto, United States	5,220	2	IRRI
BASF, Germany	4,170	2	CIMMYT
Grupo Limagrain, France	965	1	CIMMYT
Dow AgroSciences, United States	3,370	0	
Savia, Mexico	611	0	
Advanta, the Netherlands	398	0	
Agrifood sector			
Unilever, United Kingdom / the Netherlands	25,670	3	World Agroforestry Centre and IWMI
Mars, United States	17,000	1	IITA
Coca-Cola, United States	19,564	1	ICRISAT
Nestlé, Switzerland	54,254	0	
Kraft Foods, United States	29,723	0	
PepsiCo, United States	25,112	0	
ADM, United States	23,454	0	
Tyson Foods, United States	23,367	0	
Cargill, United States	21,500	0	
ConAgra, United States	19,839	0	

Sources: Corporate and industry publications, personal communications, authors.

Notes: CIMMYT is the International Maize and Wheat Improvement Center; ICARDA, the International Center for Agricultural Research in the Dry Areas; ICRISAT, the International Crops Research Institute for the Semi-Arid Tropics; IFPRI, the International Food Policy Research Institute; IITA, the International Institute of Tropical Agriculture; IRRI, the International Rice Research Institute; and IWMI, the International Water Management Institute.

^a Includes local subsidiaries and affiliates.

^b Excludes partnerships with a charitable foundation directly associated with the firm.

technology otherwise unattainable by agents acting independently, and whether synergies result from doing so.

Findings suggest that PPPs in the CGIAR are generally not being leveraged to promote innovation. Some centers do use PPPs to move research from proof of concept to product deployment—an important goal in itself. However, few centers use PPPs as a vehicle for joint processes of technological innovation—as opportunities to interact repeatedly with the private sector and leverage its expertise and assets as a means of enhancing the value of their work. Notable exceptions include CIMMYT’s apomixis research and the East Coast fever vaccine research project headed by the International Livestock Research Institute (ILRI).

Having said this, many centers are benefiting from PPPs in terms of the internal processes of organizational innovations they foster. Centers such as ICRISAT, ILRI, and the International Center for Tropical Agriculture (CIAT) have used PPPs to link their research with critical downstream innovation activities and, in doing so, to reorganize and reorient their organizational structures, practices, and cultures for greater impact.

Reducing Poverty through Partnership

Ultimately, PPPs in developing-country agriculture are about reducing poverty by providing smallholders and other vulnerable social groups with new technological options. Thus, we ask whether PPPs are effectively targeting the poor in developing countries.

Two immediate issues arise from this question. First, are PPPs identifying the right interventions—the right crops, traits, and technologies—that specifically target the poor? Second, are PPPs convening the right partners—public, private, and civil society—to generate impacts on poverty?

While this study does not attempt to evaluate the poverty impact of each partnership in the CGIAR, it does find that few PPPs are based on clear analyses of their impact pathways. Thus, several examples of less desirable practice emerge, including

- exclusive licensing of technologies for improved seed that may affect the market structure and the availability of seed to smallholders without sufficient ex ante assessment of how the licensing arrangement affects technology access and poverty reduction;
- allocation of center facilities and expertise to conduct research on high-value cash crops (for example, cotton, flowers, and oil palm) for which alternative suppliers of research may exist or from which cross-subsidies for more poverty-oriented research are not forthcoming; and
- ad hoc proposals to sell potential technologies in segregated markets (subsidized rates for poor clients, market rates for others) without sufficient evaluation of market size, structure, infrastructure, and the effects that segregation will have on the products’ price and market performance.

Risk Management and Mitigation

PPPs are beset by the same risks found in most research projects, including the possibility that (1) the research investment will not yield a successful product that is acceptable to its end users; (2) the product cannot be developed within a time period that attracts sufficient investment; (3) the product cannot surmount the legal and regulatory hurdles needed to move from proof of concept to commercial deployment; or (4) instability emerges in the wider social, political, or economic environment in which the research is conducted.

But PPPs are different from other research investments in that they also carry some very unique risks. They include the risks associated with coordinating diverse partners and interests; protecting the distinct mandates, missions, and reputations of centers and firms; and exchanging proprietary knowledge assets between the public and private sectors. These risks are particularly relevant with respect to agricultural biotechnology research undertaken by centers in partnership with leading multinational firms in the crop-science industry (Table 1).

Findings suggest that few PPP-based projects have adequate risk management or mitigation strategies in place to address the possibility of a worst-case scenario emerging from the project. Few centers and firms are investing adequately in frameworks within which to assemble partners, assign roles and responsibilities, and resolve internal conflicts as they emerge. Fewer still have adequate legal, financial, and communication strategies in place to manage external threats.

Conclusions

This study suggests that while PPPs are serving a wide variety of research objectives, the CGIAR’s partnerships with the private sector are still at a very nascent stage. Few partnerships are explicitly designed to facilitate joint innovation, an important justification for the use of PPPs. Still fewer provide for effective management of the risks inherent in PPPs or provide effective analysis of their poverty-targeting strategies. Thus, the international agricultural research system and its private partners could do more in the future to

- combine explicit knowledge exchanges (for example, straightforward technology transfers) with experiential learning approaches in which knowledge is transferred via learning by doing, learning through face-to-face interaction, hands-on collaboration, and scientific exchange programs;
- commit resources to building platforms on which to assemble relevant partners, identify incentive compatibility, agree on mutual objectives, and assign roles and responsibilities appropriately;
- devise comprehensive risk management and mitigation strategies that include recognition of the complex legal, financial, and political elements that underlie a successful PPP; and

- improve the quality of analysis of the impact pathways through which PPPs improve the well-being and livelihoods of the marginalized social groups they target.

In conclusion, PPPs are a viable approach to conducting research for development. However, it is important to note that a “one size fits all” approach to PPPs is counterproductive:

The deployment of pro-poor knowledge and technology requires different—and often creative—approaches to research. And creativity itself requires that both public- and private-sector organizations become more innovative in the ways they conduct business and build strategic relationships with each other.

David J. Spielman (d.spielman@cgiar.org) and **Frank Hartwich** (f.hartwich@cgiar.org) are research fellows in IFPRI’s International Service for National Agricultural Research (ISNAR) Division. **Klaus von Grebmer** (k.vongrebmer@cgiar.org) is the director of IFPRI’s Communications Division.

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