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Role of public-private partnership in the development of semi-arid Tropics value chain

Abstract

Public-private partnerships (PPP) form the basis of potential opportunities for pro-poor agricultural research and development in the developing countries. National governments and donors are increasingly looking to private sector to take over many of the roles that government has withdrawn from, but the public sector still harbors a mixed attitude towards the private sector. ICRISAT strongly believes in the power of partnerships and has broadened the base of partnership over the years. ICRISAT has trail-blazed partnerships with private companies, start-up companies, seed companies, foundations and trusts. The PPP initiatives of ICRISAT include Hybrid Parents Research Consortia, Platform for Translational Research on Transgenic Crops, and the Agribusiness and Innovation Platform that includes three programs, namely: Agribusiness Incubation, Innovation and Partnership, and NutriPlus Knowledge. ICRISAT through this innovative institutional model of PPP has been focusing on the development of smallholder farmers by providing them with the latest farm technologies, new seed materials and market and business linkages. Over the years, ICRISAT has evolved mechanisms in collaboration with the private sector that support these farmers directly and indirectly. These PPP initiatives have created a wider impact on society and especially farmers by linking them to markets, thereby enhancing the Inclusive Market Oriented Development (IMOD) strategy of ICRISAT.

Key words : Q1.



Résumé

Rôle du partenariat public-privé dans le développement des chaînes de valeur pour les tropiques semi-arides

Les partenariats public-privé offrent de réelles opportunités pour la recherche agricole pour le développement. Les gouvernements ainsi que de nombreuses agences de financement se tournent de plus en plus vers le secteur privé pour assumer un certain nombre de tâches dont les gouvernements se sont désengagés. Cependant, le secteur public garde une attitude ambivalente par rapport au secteur privé. ICRISAT croit fermement dans le pouvoir du partenariat et a élargi sa base de partenaires depuis quelques années, avec des entreprises, des start-ups, des entreprises semencières, des fondations et des trusts. Dans le cadre de ces partenariats ICRISAT a développé diverses initiatives telles que *Hybrid Parents Research Consortia*, *Platform for Translational Research on Transgenic Crops*, et *Agribusiness and Innovation Platform* qui se décline en trois programmes : *Agribusiness Incubation*, *Innovation and Partnership*, et *NutriPlus*

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Knowledge. Par le biais de ce modèle institutionnel innovant, ICRISAT a pu mettre l'accent sur le développement des petits producteurs en leur fournissant les dernières technologies agricoles, de nouvelles semences, ainsi que des liens avec le marché et les entreprises. Au cours des années, ICRISAT a développé des mécanismes en collaboration avec des partenaires privés qui appuient les paysans directement et indirectement. Ces partenariats public-privé ont abouti à un impact plus large sur la société et en particulier sur les paysans, en les connectant au marché, valorisant ainsi la stratégie intégrée de développement « orienté-marché » d'ICRISAT.

Mots clés : 



The Public-private partnerships (PPPs) form the basis of potential opportunities for pro-poor agricultural research and development in developing countries. PPPs are defined as any joint effort between public and private entities in which each contributes to planning, commits resources, shares risks and benefits, and conducts activities to accomplish a mutual objective (Spielman and von Grebmer, 2006). PPPs are also defined as contractual arrangements between the public sector and a private sector party for efficient and effective delivery of technologies, infrastructure services or other basic services. As noted by Hartwich *et al.* (2007), partnership building is a dynamic process and not a static event. Referring to business partnerships between firms, public and business administration literature (Harrigan, 1986; Hennart, 1988; Kogut, 1988; Oliver, 1990; Bonache and Fernández, 1999) argues that partnerships go through processes of creation and maturation involving a set of sequential steps.

National governments and donors are increasingly looking to private sector to take over many of the roles that government has withdrawn from, but the public sector still harbors a mixed attitude towards the private sector.

ICRISAT strongly believes in the power of partnerships and has broadened the base of partnership over the years. The synergy between ICRISAT and the private sector has made effective use of complementarities in resources and skills to ensure that high research outputs and technologies reach the farmers effectively and efficiently to create impacts in their livelihoods.

ICRISAT PPP initiatives in SAT

The relationship between ICRISAT and private sector companies, especially in

India, has evolved over time. ICRISAT has trail-blazed partnerships with private companies, start-up companies, seed companies, foundations and trusts. In the past, ICRISAT has played a nurturing role to the fledgling seed industry and provided breeding material, often through informal networks. As private sector seed companies grew, they started to develop significant research and development capabilities of their own. ICRISAT scientists soon recognized that the Institute's traditional relationship with the national public sector, though important, was no longer the sole route to farm-level adoption of improved cultivars. Recent years have witnessed remarkable growth in private sector investment in crop improvement research and development, especially in crops that provide hybrid cultivar options. The private sector, being close to the hybrid seed merchants and farmers, has a better and integrated perception of farmers' choice and needs. This realization was all the more pertinent as the succession of funding shocks in ICRISAT and other CGIAR centres were accompanied by increased scrutiny of the impact of international agricultural research. Based on this, ICRISAT recognized private sector seed companies as valuable research partners and a prominent participant for collaborative research on hybrid cultivar development and seed production. This led to the conceptualization and initiation of ICRISAT's Hybrid Parents Research Consortia (HPRC) in 2000, the first of its kind in the entire CGIAR system as a PPP model. The HPRC was formed with the basic objective of increasing the scope of accessibility to better hybrids by poor farmers through effective public private partnerships. The recognition of the private sector as a valuable research and development (R&D) partner led to the formation of the Sorghum and Pearl Millet Hybrid Parents Research Consortia in 2000. A consortium for Pigeonpea Hybrid Parents was started in 2004. ICRISAT has been providing genetically improved diverse breeding lines and hybrid parents to partners in both public

research institutions and private sector seed companies globally. Using the improved hybrid parents, public institutions and private sector seed companies have developed and marketed several hybrids over the past two decades. These hybrids have enabled farmers to realize higher yields, enhanced incomes and improved livelihoods.

The Consortium Model of Partnership ICRISAT is a publicly-funded R&D Institute, and the products of its research are international public goods (IPGs). Following discussions on several alternative models of partnerships with the private sector, the "Consortium model" was preferred for partnership with private sector seed companies. According to the consortium, the products of ICRISAT research (improved breeding lines) remain in the public domain. Materials are available to public sector institutions freely at all stages of development. Under this model, which operates in a renewable 5-year framework, each private sector seed company seeking membership in the Consortia (one consortium each for sorghum, pearl millet and pigeonpea) signs a Memorandum of Agreement (MoA) agreeing to the guidelines of the Consortium. The Consortium guidelines were agreed upon following several rounds of consultation among potential partners. Each seed company pays an annual Consortium fee to become a member (either Primary or Promotional member). A Consortium Advisory Committee (comprising members from private sector (PS) Seed companies and ICRISAT) is chaired by one of the PS Seed Company representatives, and provides guidance and advice for consortia research and development activities.

Public-private partnership on water management for the poor

The partnership between ICRISAT and Jain Irrigation Systems Ltd (the world's second largest micro-irrigation company)

is anchored on a shared goal of empowering poor dryland communities through sustainable water management. PPP particularly with seed and irrigation industries is an innovative approach in mobilizing improved technology for smallholder farmers. PPP and Inclusive Market-Oriented Development (IMOD) are the key components in linking farmers to markets towards prosperity in the dryland tropics. In order to increase incomes and improve the livelihoods of dryland farmers and landless people in Asia, ICRISAT, NARS (National Agriculture Research System) and NGOs together developed an innovative farmer-participatory consortium model for integrated watershed development (Wani et al., 2008). The model builds on the strengths of the consortium partners, tangible economic benefits, equity empowerment and a participatory approach to achieve its objectives while at the same time minimizing land degradation and protecting the environment. The consortium has been expanded to include public and private enterprises to provide forward and backward linkages to increase rural incomes and empowerment opportunities and enhance production. The ICRISAT-led watershed consortium entered a partnership in four areas to augment funding for research to achieve accelerated/improved incomes and livelihoods for resource-poor farmer through: a) scaling-up an innovative participatory consortium; b) facilitating the cultivation and processing of medicinal and aromatic plants; c) production of biodiesel; and d) strengthening private sector research to serve farmers.

PPP approached in crop diversification

Crop diversification minimizes the risk of crop failure that might result from the vagaries of the climate and also helps farmers increase their incomes. Farmers in the moderate climates of the drylands can choose from a wide variety of crops for diversification, provided the risk of drought can be managed. Many of these are high-value crops and have tremendous market potential.

Vegetables in West and Central Africa

Highly productive small market gardens are essential alternatives that are helping to reduce poverty and improve

nutrition in the Sahel region of Africa. They can be particularly profitable for the most marginalized members of society. Vegetables are considered a luxury as poor farmers do not have the means to purchase food after droughts, and in 2010, 2.5 million people in Niger were in the grip of a famine due to drought-induced crop failure.

Medicinal and aromatic plants

ICRISAT has adopted yet another innovative approach for improving livelihoods through crop diversification. This is through public-private partnerships (PPP) to link smallholder farmers with reliable partners who provide production technology and market high-value medicinal and aromatic plants (MAPs) (Ravinder Reddy et al., 2008). The lead crops selected under the ICRISAT-Andhra Pradesh Rural Livelihoods Programme (APRLP) project titled Medicinal and Aromatic Plants for Diversifying Semi-Arid Tropical (SAT) Systems: A Case of Public Private Partnership (PPP) include lemon-grass (*Cymbopogon flexuosus*), coleus (*Coleus forskolii*) and Ashwagandha (*Withania somnifera*).

Platform for Translational Research on Transgenic Crops (PTTC)

PTTC is a unique initiative of ICRISAT with the support of Department of Biotechnology, Government of India to facilitate the translational/advancement of potential transgenic technologies into usable products. PTTC features a state-of-the-art facility with a built area of about 53,000 Sq. Ft in three phases and 10 hectares of field facilities. Phase I comprises of well sophisticated laboratory facilities like high-throughput transformation facility, molecular biology lab, instrumentation facility, walk-in cold rooms, etc. Phase II and III comprise of P2 level contained greenhouses and pathology and virology labs, insect rearing facility, transgenic seed storage facility, etc. respectively. Field facilities include well equipped containment facilities for carrying out phenotypic evaluation of virus resistant, drought and salinity tolerant, fungal resistant, varieties. Further, PTTC currently has established a network of expert agencies and national centres, both public and private, for carrying out studies involved in the product development of transgenic

crops but beyond the scope of in-house capacity development such as toxicity, allergenicity studies, multi-site field trials, etc.

PTTC is making diligent efforts to achieve the ultimate goal of using crop biotechnology in a socially responsible way for addressing the food security crisis and agricultural needs. The platform will focus predominantly on translating the public sector technologies in addition to the contract research activities for the small and medium scale companies. Further, models of partnerships, including consortium and co-development, are also being explored. PTTC received welcome response from the stakeholders and industry for the transgenic pigeonpea development consortium initiated by PTTC. After a series of stakeholder meetings, the detailed proposal is under development and is expected to be rolled out soon.

The Agribusiness and Innovation Platform @ ICRISAT

Agribusiness and Innovation Platform (AIP) is an initiative of ICRISAT to enhance its public-private partnerships as a model for fostering agribusiness to bring research for development (R4D) innovations of ICRISAT and its partners to the market for faster, wider-scale impact. AIP through agribusiness significantly increase the resilience of tropical dryland smallholder farming through innovations that stabilize, safeguard and enhance livelihood capital (natural, social, human, physical and financial), biological and systems diversity, and land health. AIP is in line with ICRISAT's unifying conceptual framework of Inclusive Market-Oriented Development or IMOD as one of the Critical Focus Areas (CFAs) on "fostering agro-enterprise". AIP includes Agribusiness Incubation (ABI) program, Innovation and Partnership (INP) program and NutriPlus Knowledge (NPK) program.

To achieve its mission, AIP operates three programs towards furthering ICRISAT's mission as follows:

- *ABI program*: Promoting agribusiness ventures through technology development and commercialization that benefit the SAT farmers directly or indirectly through incubation services in seed, biofuel, farms, agri-biotech or innovative ventures;
- *INP program*: Initiating PPP through collaborative research cum development agreements with ICRISAT scientists in

the areas of plant breeding, agricultural biotechnology, natural resource management, knowledge sharing, training and value chain development that support the empowerment of the SAT farmers;

- *NPK program*: Value addition and post-harvest management in agrifood sector through innovative processing, product development and enhancing food safety.

Operations of AIP

Clients of AIP are engaged through various instruments including Memorandum of Understanding, Agreements and Contract Research Agreements. AIP conducts due diligence for the identification and selection of clients and partners before their acceptance into AIP and its three Programs. This due diligence process has been evolved in line with the mission and goals of ICRISAT. Partnerships within AIP place no additional cost of its operation on ICRISAT and ensure long-term financial sustainability of AIP and its constituent Programs. AIP and its programs use different approaches for engaging with

public and private sector for commercializing its technologies (*figure 1*).

Innovation and Partnership program

INP was established with support from the Government of Andhra Pradesh as a bigger platform for already established agri-companies to collaborate with ICRISAT on R&D front. Established in 2007, the INP program is a platform for already established agri-companies/institutions to associate with ICRISAT on partnership research that can translate research for development (R4D). INP program develops strong collaborative research and development partnerships with public, private and allied sectors to benefit the small holding farmers of dry land tropics across the agricultural value chain. INP is also instrumental in organizing event and conferences that bring together the global minds in agriculture for the cause of the smallholder farmers. INP focuses on market research and opportunity mapping, strategic marketing and partner specific value proposition and Collaborative Research

Agreement (CRA) development through:

- strategic partnerships for enhancing IMOD;
- co-creation of institutional innovation models;
- value chain innovations;
- collaborative research and PPP projects;
- common infrastructure and facilities creation.

Agri-Business Incubation program

ABI was started with support from the Department of Science and Technology, Government of India in 2003 to facilitate the creation of competitive agribusiness enterprises through technology development and commercialization for the well-being of the poor farmers of the semi-arid tropics. ABI promotes technologies that have been developed either exclusively by ICRISAT, or jointly developed with its NARS partners.

The ABI program is a pioneering concept to incubate agri-ventures and facilitates business for entrepreneurs and technology developers. ABI supports business initiatives with a host of services and facilities in the areas of technology commercialization and new venture creation. ABI offers technology consultancy, business facilitation, training, office space, agricultural land, computers and IT enabled aids, etc., that are required for entrepreneurs. The key focus areas of ABI are as follows:

- to accelerate agricultural based technology transfer and commercialization;
- to foster creation, development and innovation of agribusiness to farming communities to maintain competitive edge;
- to provide services to start-up agribusiness on technology, business consultancy, business development, funding assistance, infrastructure facilities and escort services;
- to promote agri-technologies developed by ICRISAT or developed by other R&D centres of excellence, universities, ICAR (Indian Council for Agriculture Research), CSIR (Council for Scientific and Industrial Research), and other institutions;
- to be a champion for creating entrepreneurs by helping agribusinesses sustain and succeed.

ABI-ICRISAT has promoted over 180 ventures in different areas of agribusiness, including innovative ventures, Agri-biotech ventures, biofuel ventures, seed business ventures and co-business incubation. ABI-ICRISAT has been



Figure 1. Components of the Agribusiness and Innovation Platform (AIP) at ICRISAT and their activities.

servicing farmers with its innovative programmes, such as agricultural extension, rural seed business ventures, and innovative ventures for the benefit of the farming community with the objective of raising farm incomes and creating new business opportunities for farmers as follows:

- *seed ventures*: Seed business incubation is a unique initiative, aimed to self-sustain the rural seed ventures through entrepreneurship to promote and address the basic demand and supply gap of quality and new varieties of seeds, especially open-pollinated varieties (OPVs) to the farmers. This benefits multiple stakeholders through sustainable rural entrepreneurship, quality seeds at village level and commercialization of seeds by research institutes. ABI facilitates the development of an integrated cost effective seed system that is capable of generating, producing and distributing improved seed varieties of ICRISAT Mandate Crops- Groundnut, Chickpea and Pigeonpea to meet the needs of resource-poor farmers in partnership with private sector and NGOs. This approach created an alternate channel for seed delivery in target crops benefiting the farmers through increased productivity and profits.

- *biofuel ventures*: Biofuels is an important focus area where ABI promotes industries in ethanol production from sweet sorghum and other agricultural feedstocks.

- *farm ventures*: ABI-ICRISAT promotes farm ventures in the area of Contract farming, Organic farming, Precision farming and value chain development etc.

- *agri-biotech ventures*: ABI-ICRISAT promotes seed companies in the emerging area of agri-biotech in developing Transformation protocol for commercial crops, Marker development for traits of interest for seed producers, and Tissue culture of medicinal, horticultural, and tree crops.

- *innovative ventures*: ABI promotes innovative ventures that are proprietary products or novel service that has good market potential.

• Technologies commercialized

Groundnut ICGV 91114

This is one of the latest groundnut varieties developed by ICRISAT that helps farmers obtain a higher yield, an average of approximately 10% (ranging between 5 and 26%) more than the traditional TMV 2 variety that had traditionally been used in this area,

which also withstands longer periods of drought. Five thousand acres are under this crop in Anantapur district of Andhra Pradesh.

Chickpea KAK-2 and JG-11

The ICRISAT chickpea varieties KAK-2 and JG-11 are the new varieties that are ideal for confectionary and table consumption. The Agri-Business Incubator-ICRISAT along with the Andhra Pradesh State Seed Development Corporation and Aakruti Agricultural Associates of India have commercialized these varieties on 3,000 acres in Anantapur and Ongole districts of Andhra Pradesh.

Bt Cotton

ABI-ICRISAT helped two of its clients, M/s Bioseed Research India Pvt. Ltd., and Seed works India Pvt. Ltd., who have licensed Bt Cotton from Monsanto-Mahyco India. A product of the Bioseed Company, "BajrangiBt" was released in June 2007, two years ahead of schedule. So far, 500,000 Bt Cotton seed packets of 1 lb each, have been sold during the 2009 rainy season, thereby benefiting over 200,000 farmers.

Bio Fermi (BTA fermentors)

A fermentor technology developed by ICRISAT was commercialized by ABI-ICRISAT through a start-up company to produce low cost but high quality biopesticides and biofertilizers. This has benefited the farming community by making available high quality biofertilizers at an affordable price. Twenty-five units of this fermentor have been sold to small companies.

Biopesticides

ABI-ICRISAT assisted ICRISAT scientists in commercializing the biopesticide technology through an innovative model on public-private partnership through consortium approach. Ten companies are members of BRC, thereby gaining access to new production technologies.

Organic food products

ABI supported a partner for organic food products development by providing training on organic farming and agricultural extension through a technology-based entrepreneurship program.

Value chain development

ABI is supporting 2 partners to produce Aflatoxin-free groundnuts, chilli and corn and potatoes for Chips industry through value chain analysis and development approach.

The Indian project of ABI program

• National Agricultural Innovation Project (NAIP)

NAIP of the ICAR is a World Bank funded project that supported the setting-up of ten Business Planning and Development (BPD) units in its research institutes and state agricultural universities (SAUs). NAIP has entrusted the ABI-ICRISAT with the responsibility of hand-holding and mentoring these BPD's under its component-1; the catalyzing agent for management of change in the Indian NARS. All the ten BPD units and ABI-ICRISAT have joined hands to form a Network of Indian Agri-Business Incubators (NIABI). NIABI is a one-stop solution for technology transfer and innovative ventures through co-business incubation, providing support and services covering agriculture and allied sectors. NIABI helped in creating pool of technologies that can be commercialized, opened funding avenues and provides mentoring support to start-up ventures.

Within a short period of under two years of inception, the ten BPDs under the NIABI network have successfully generated US\$ 175,000 through technology commercialization with the gross revenue of US\$ 550,000 as on February 2011 and have gradually become sustainable through Incubation membership, Consultancy, Rentals and Lease, Training, Business development Service charge, allied projects and Internal projects (value chain, etc.). The other outcomes include generation of 216 leads, enhancement of capacity building through training 1412 entrepreneurs through 47 training camps. New Initiatives of Ministry of Micro, Small and Medium Enterprise (MSME) and Department of Science and Technology (DST) augmented seven BPDs through additional funding of US\$ 1.2 million for 7 BPDs.

Network locations:

- Lead Centre: ABI-ICRISAT, Patancheru, Andhra Pradesh;
- Anand Agricultural University (AAU), Anand, Gujarat;
- Birsra Agricultural University (BAU), Ranchi, Jharkhand;
- Central Institute of Fisheries Technology (CIFT), Cochin, Kerala;
- Central Institute for Research on Cotton Technology (CIRCOT), Mumbai, Maharashtra;
- Chaudhary Charan Singh Haryana Agricultural University (CCSHAU), Hisar, Haryana;
- Indian Agricultural Research Institute (IARI), New Delhi, Delhi;

- Indian Veterinary Research Institute (IVRI), Izatnagar, Uttaranchal;
- Jawaharlal Nehru Krishi Vishwa Vidyalyaya (JNKVV), Jabalpur, Madhya Pradesh;
- National Institute of Research on Jute and Allied Fibre Technology (NIRJAF), Kolkata, West Bengal;
- Tamil Nadu Agricultural University (TNAU), Coimbatore, Tamil Nadu.

- **Technopreneur Promotion Program (TePP)**

In 2008, ABI-ICRISAT was accredited as an outreach Center for TePP by the Ministry of Science and Technology, Government of India. TePP is jointly operated by the Department of Scientific and Industrial Research (DSIR) to tap the vast innovative potential of the citizens of India. TePP is a mechanism to promote individual innovators to become technology-based entrepreneurs (Technopreneurs). It provides financial support to individual innovators for converting their ideas into conceptual prototypes and or working models (through a screening and approval process). Under the TePP, ABI-ICRISAT conducts entrepreneur camps to scout innovations. So far, 21 proposals have been forwarded to DSIR and is currently supporting 5 entrepreneurs.

- **Micro, Small and Medium Enterprises**

Since 2010, ABI-ICRISAT has been implementing the scheme for the Support for Entrepreneurial and Managerial Development of SME through Incubators of the Ministry of Micro, Small and Medium Enterprises, Government of India. Under this scheme, potential entrepreneurs are selected for providing a grant to develop their innovative ideas and technologies into small-scale viable ventures with support from the incubator. The scheme provides early stage funds for nurturing innovative business ideas, which could be commercialized in a year. It also seeks to promote networking and forging of linkages with other constituents of the innovation chain for the commercialization of their developments. The organization submits the proposals throughout the year in the prescribed application format and is expected to recommend 10 business ideas per year. Currently, there are a total of 11 innovations and ABI-ICRISAT monitors the proposals from time to time.

- **Technology Development Board**

The Technology Development Board (TDB), Ministry of Science and Technol-

ogy, Government of India is enacted to provide soft financing to Indian companies for enabling commercialization of their innovations. TDB provides Seed Support Scheme for technology start-ups in Technology Business Incubators (TBI's)/Science and Technology Parks (STEPs) by providing grant of up to US\$ 200,000 each over a period of up to three years. TDB has instituted Seed Support Fund to provide early stage financial assistance to the young entrepreneurs in bringing our innovative technology venture ideas to fruition. The assistance is meant as early stage funding for indigenous ideas and technologies requiring scale-up and related work or for sowing the Seeds of ideas and converting young potential entrepreneurs as future clients of TDB. Under TDB scheme, ABI-ICRISAT is currently supporting a total of 11 clients.

- **Network of Indian Agri-Business Incubators**

NIABI is an initiative of the ICAR –NAIP coordinated by the Agri-Business Incubator at ICRISAT operating out of 10 BPD Units or business incubators at the ICAR's Research Institutes and State Agricultural Universities across the country. ABI-ICRISAT is handholding and mentoring these 10 BPD units engaged in business incubation activities. The mission of NIABI is "to enhance agri-business development and impacts on agriculture through co-business incubation". It is an initiative taken by ABI-ICRISAT to strengthen the agribusiness incubation activities in India. NIABI covers agriculture and its allied sectors.

- **Impacts generated by ABI**

- Supported over 110 ventures, including 20 companies, 65 seed ventures, 20 innovators, and 20 co-business incubatees.
- Benefited over 40,000 farmers.
- Through commercialization of groundnut ICGV 91114 and chickpea JG 11 and KAK 2, around 8000 acres have been covered in Ananthapur district in Andhra Pradesh.
- The introduction of sweet sorghum as an economic crop led to its cultivation in about 3000 acres of Medak district in Andhra Pradesh.
- Bajrangi Bt cotton commercialized by Sriram Bioseed has covered over 40,000 acres.
- Exchanged 50 technologies and generated the direct employment of around 627, and mobilized USD 11 million of funding for the incubatees.

- As a ripple effect of ABI-ICRISAT operations, other institutes, such as ICAR and SAUs and African nations have been inspired to develop such incubators.

Nutriplus Knowledge program

The NPK program setup in 2008, aims to work towards value-added new product development, technology commercialization, training, food safety, capacity building, technical consultancy, quality control services and R&D for value addition. NPK is a platform for R&D and innovations in food processing with focus on cereals, legumes, fruits and vegetables, medicinal and aromatic plants. The verticals for applied research are nutraceuticals, fortified foods, flavors and fragrances, phytochemicals, functional foods, functional beverages, food additives and colour bioactives and enzymes, post-harvest management and bioproducts. NPK program was setup with the assistance of the Government of Andhra Pradesh.

- **PPP Model of ICRISAT**

ICRISAT through its various approaches in the form of PPP has been focusing on the development of smallholder farmers by providing them with the latest farm technologies, new seed materials and market and business linkages. Over years, ICRISAT has evolved mechanism in collaboration with the private sector that supports these farmers directly and indirectly. Under this mechanism, ICRISAT adopted a partnership approach wherein the private sector companies like start-ups, SMEs and large companies collaborate with the appropriate PPP interphase of ICRISAT. ICRISAT ensures that the objective of this partnership is to provide benefit to the farmers in an indirect way. The three mechanism of ICRISAT PPP innovation model is to have collaborative partnership with large companies, business incubation of start-ups and SMEs and value addition of the mandate crops through technology development. These mechanisms are part of ICRISAT's innovative institutional model of PPP as illustrated below in *figure 2*.

The way forward

Collaboration with private companies across Asia by ICRISAT revealed that strong partnerships can enhance the impact of research and development on

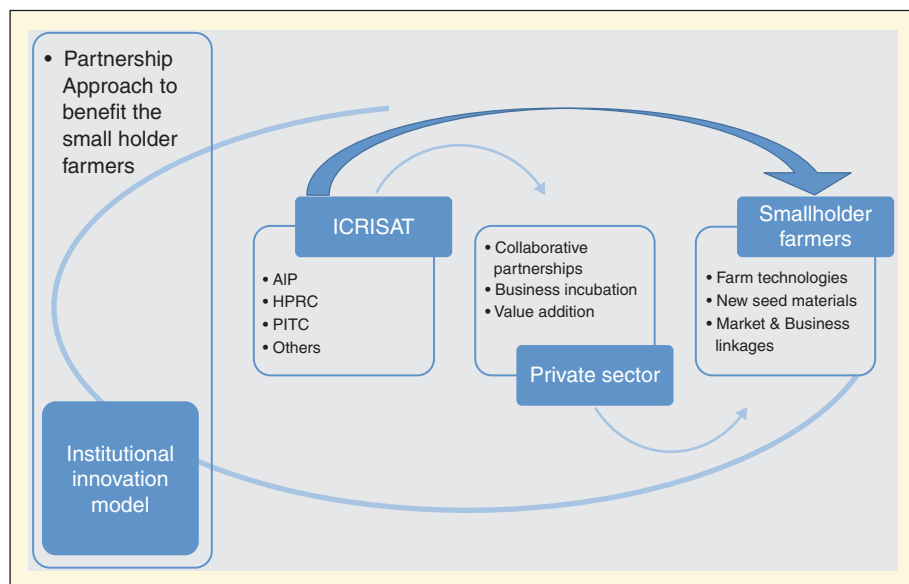


Figure 2. Institutional Innovation model at ICRISAT.

AIP: Agribusiness and Innovation Platform; HPRC: Hybrid Parents Research Consortia; PITC: Platform for Translational Research on Transgenic Crops.

the farming community. Also, private sector companies can help move on-the-shelf technologies to the field as they have the needed infrastructure. Public-Private Partnerships have to be promoted among the existing R&D institutions across the global which could breach the borders for technology commercialization and agripreneurship promotion and benefit the farming community. Agricultural educational and research institutions have many farm innovations and these can be effectively commercialized only through appropriate PPP models. Such commercialization can bring in a definite

change in the farming system especially in the resource poor regions like SAT. With the advent of the problem of climate change and food security the PPP models shall be one of the answers. Increased assistance to PPP models in all the agrarian nations especially in African and South Asian countries can bring in a fillip to small holder farmers which could ultimately contribute to the enhanced food grain production. On a global platform, such PPP initiatives various regions and countries are looking to join together and create a higher platform which shall serve all the farmers in various developed, develop-

ing and underdeveloped nations linking them in the value-chain and providing better market opportunities for them through globalization. ■

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Author queries

- Q1 please provide the appropriate English keywords
- Q2 please provide the appropriate French keywords
- Q3 Please check the breakdown into the various sections, subsections and sub-subsections which is NOT AT ALL CLEAR in many parts of this paper!!!
- Q4 reference not in list
- Q5 m=??
- Q6 publisher?

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