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## Public private partnership in agriculture and allied sector: A review

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### Abstract

The agriculture and allied sectors in India face persistent challenges such as climate change, shrinking cultivable land, water scarcity, and recurring disease outbreaks. Addressing these issues requires coordinated, system-wide innovation that extends beyond the capacity of individual stakeholders. This review explores the evolution, relevance, operational models, and impact of Public-Private Partnerships (PPPs) as effective mechanisms for agricultural development. PPPs-contractual collaborations with shared planning, resources, and risks-combine private sector efficiency with public sector responsibility. Although PPPs in India have expanded rapidly, agriculture and allied sectors remain underrepresented compared to infrastructure, especially roads. The review outlines key PPP models, including BOT, BOO, and Joint Ventures, and highlights notable examples such as Project Golden Ray, ITC's e-Choupal, and Karuna Animal Ambulance Services. These cases demonstrate improvements in productivity, market access, and animal health. Despite challenges like coordination gaps and corruption risks, well-designed PPPs are crucial for driving investment, innovation, and farmers' income growth.

**Keywords:** Agriculture, allied sector, public private partnership (PPP)

### Introduction

Public private partnership is a long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility and remuneration is linked to performance (World Bank). In India PPP is defined as "a partnership between a public sector entity and a private sector entity (51% or more of equity is with the private partner/s) for the creation and/or management of infrastructure for public purpose for a specified period of time (concession period) on commercial terms and in which the private partner has been procured through a transparent and open procurement system" (Nanda, S.S., 2015) <sup>[12]</sup>. The Planning Commission of India describes Public-Private Partnership (PPP) as a collaborative model in which government programmes are executed with private sector participation. In this approach, private partners may contribute to financing, designing, constructing, operating, or maintaining public projects. PPPs involve shared planning, resources, activities, and risks through cooperative, contractual arrangements with flexible ownership. This model strengthens limited public funds, enhances competition, improves efficiency, and helps reduce overall project costs. Indian farmers today face major challenges such as climate change, pest and disease outbreaks, limited irrigation, water scarcity, and inadequate credit. At the same time, cultivable land is steadily decreasing. The grain-producing area available per person has fallen from 0.22 hectares in 1950 to a projected 0.06 hectares by 2050, indicating increasing pressure on agricultural resources (Larsen, 2003) <sup>[10]</sup>. Challenges in agriculture cannot be addressed by any single stakeholder; they demand coordinated system-wide innovation. Because production, processing, and marketing constantly evolve with changing consumer needs, the sector must adopt innovative strategies to effectively respond to these emerging demands (Ponnusamy, 2013) <sup>[14]</sup>. Public-Private Partnerships provide valuable scope for promoting livestock research, supporting pro-poor growth, and advancing overall development in developing nations (Spielman and Grebmer, 2004) <sup>[17]</sup>. Growing responsibilities and shrinking budgets in government veterinary services have created a need to engage service providers beyond the public sector.

Effective collaboration between public and private actors through Public-Private Partnerships (PPP) can strengthen agricultural sustainability in low-income countries. In the livestock and agriculture sectors, PPPs enable advanced research, technology development, and the delivery of innovative products that benefit smallholders, resource-poor farmers, and marginalized communities (Anonymous, 2014) [1].

### History and present status of PPP in India

The PPP model originated in Europe, particularly Italy, as a collaboration in which public and private sectors jointly mobilize private investment to create public assets and services. India has long used similar arrangements-such as the Great Indian Peninsular Railway (1853), the Bombay Tramway (1874), and early power distribution in Mumbai and Kolkata. The idea aligned with India's mixed-economy approach adopted in 1948 under Nehru, encouraging both public and private participation in nation-building. However, heavy regulation later created mistrust and slower economic growth, leading to fiscal stress and balance-of-payment issues. This prompted renewed cooperation, including involving business leaders in policymaking through the Rajya Sabha, helping rebuild trust and strengthen PPPs. After limited activity until the early 2000s, PPP projects expanded rapidly-rising from 86 projects before 2004 to over 758 by 2011, and about 881 projects worth over INR 5.4 trillion by 2013 across multiple sectors. Road projects make up the majority of PPP initiatives in India, representing about 52% of all partnerships. However, social sectors like health and education remain underrepresented, contributing only 3.7% of PPP projects. To support long-gestation infrastructure ventures, the India Infrastructure Finance Company Limited (NBFC) was created to provide necessary financial assistance (Gupta & Singh, 2018) [8]. Currently in India, 9,242 projects worth ₹6,813,008.32 crore are operating under the PPP model across 28 sectors (Anonymous<sup>a</sup>).

### Need of PPP in agriculture and allied sector

- Greater emphasis is being placed on agricultural research and innovation.

- The increase in MSP is motivating farmers to continue and expand cultivation.
- Farmers now have wider access to various forms of institutional finance.
- Crop productivity is improving due to the adoption of superior-quality seeds.
- Farm operations are becoming more mechanized, enhancing efficiency.
- The area covered under irrigation is steadily expanding.
- Ensuring adequate food supply for a growing population has become a national priority.
- Demand is rising for agricultural inputs such as crop protection products, advisory services, seeds, and fertilizers.
- Effective veterinary services are essential for improved disease prevention and control.
- Genetic advancements and better management practices are boosting livestock production.
- Improving the processing and marketing systems for agricultural and livestock products is becoming increasingly important.

### Features of PPP

#### Comparison Between Public, Private and PPP Attribute

In privatization, the private sector takes full responsibility for funding and delivering a service, along with ownership of the assets and all associated risks. In contrast, PPPs keep the government responsible for service provision, while ownership usually remains with the public sector. In privatization, the private provider decides the scope of services, whereas in PPPs, these are defined through a contract. Risks in privatization lie entirely with the private party, but in PPPs they are shared between the government and the private sector (Bafanda & Khandi 2018) [4].

| Attributes         | Public       | Privatization               | PPP                                  |
|--------------------|--------------|-----------------------------|--------------------------------------|
| Responsibility     | Govt.        | Entrepreneur                | Govt.                                |
| Ownership          | Govt./Public | Private sector              | Govt.                                |
| Nature of services | Govt.        | Decided by private operator | Mutual agreement                     |
| Risk & reward      | Govt./Public | Private sector              | Shared between Govt. & Private party |

(Bafanda & Khandi 2018) [4]

**Table 1:** Difference Between Privatization and PPP

| Privatization                                                                              | Public-Private Partnership (PPP)                                                                    |
|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| The private sector takes full charge of financing and delivering the service.              | The government retains primary responsibility for ensuring service delivery.                        |
| Asset ownership is transferred to the private entity, along with benefits and liabilities. | Asset ownership generally remains with the government while the private partner manages operations. |
| The private operator decides the scope and manner of service delivery.                     | The scope of work and service standards are defined jointly through a formal contract.              |
| Most operational and financial risks are borne entirely by the private sector.             | Risks and returns are shared between the government and the private partner.                        |

(Bafanda & Khandi 2018) [4]

### Applicability of PPP

**A project may be taken up through the PPP route when one or more of the following conditions are present:**

- The government faces financial limitations or lacks the required technical expertise to execute the project independently.
- Involving private investors can enhance service quality, raise service standards, or speed up project completion.

- The project allows for healthy competition among potential private sector participants.
- Private sector participation opens avenues for new ideas, improved methods, and innovation in public service delivery.
- There are no legal or regulatory barriers that prevent private sector involvement in delivering the service.

(Husain & Amin 2018)<sup>[9]</sup>**Conditions for a successful PPP**

For a public-private partnership to be effective, it should meet at least three basic criteria:

- **Value for the private partner:** The project should offer financial returns or help the private company access new markets.

- **Value for citizens:** It must provide services that people need and might not receive at the same cost or quality under normal government delivery.
- **Value for the government:** The initiative should help the government meet policy goals, social responsibilities, or broader development objectives.

(Husain & Amin 2018)<sup>[9]</sup>**Table 2:** Models of PPP

| PPP Model                           | Description                                                                                                                                                                                                                             |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Build-Operate-Transfer (BOT)        | The private partner finances, constructs, and operates the facility for a fixed period, recovering costs and earning profits. After the contract term, the asset is handed back to the government. Commonly used in roads and highways. |
| Build-Own-Operate (BOO)             | The private entity finances, builds, owns, and runs the infrastructure permanently. The facility remains under private ownership while service output (e.g., treated water) may go back to public utilities.                            |
| Leasing                             | The government leases facilities to private operators who manage and run them. The private partner handles operations but does not fund capital investment, reducing financial burden for both sides.                                   |
| Concessions                         | The private company takes full responsibility for delivering services in a specific area, including necessary investments. The government shifts to a regulatory role, overseeing pricing and service quality.                          |
| Joint Ventures                      | Public and private partners co-invest, co-own, and jointly operate a facility, sharing both control and benefits. This may also involve development organizations.                                                                      |
| Operational / Management Contracts  | The private sector is contracted to manage operations or provide specialized services for a limited period. Common in agro-processing units, plantations, and outsourced extension services.                                            |
| Informal Public-Private Cooperation | Non-contractual collaborations among government, NGOs, donors, and private firms aiming to address social needs, deliver services, or provide infrastructure through voluntary partnerships.                                            |

(Shukla *et al.* 2016)<sup>[15]</sup>**Advantages of PPP**

- **Better Value for Money:** PPPs help deliver high-quality infrastructure or services for the same cost by improving efficiency and performance.
- **Risk Sharing:** Project risks are shifted to the private party that can handle them more efficiently and at a lower cost.
- **Access to Private Expertise:** The government benefits from advanced technical, managerial, and operational skills of private partners, often leading to faster project completion.
- **Enhanced Competition:** Involvement of private firms promotes competitive pricing, innovation, better service delivery, and higher investment.
- **Cost Efficiency:** Savings arise from competitive bidding, optimal risk allocation, and integrated project management.
- **Faster Project Delivery:** Private firms often complete projects sooner due to stronger project management and the incentive that payment begins only after completion.
- **Reduced Fiscal Burden:** PPPs lower the upfront financial pressure on the government for infrastructure development.
- **Wide Institutional Support:** These models typically receive acceptance from central, state, and local authorities.
- **Additional Benefits:** PPPs encourage innovation, bring in specialized project development experience, increase transparency, and involve third-party financiers.

**Disadvantages of PPP**

- **Higher Development Costs:** PPP projects often incur significant planning, negotiation, and contract-management expenses.
- **Coordination Challenges:** Involvement of multiple partners can lead to communication gaps or misunderstandings.

- **Risk of Inefficiency:** Limited competition or long-term contracts may sometimes reduce operational efficiency.
- **Cultural Differences:** Public and private sectors often operate with different work cultures, which can lead to mistrust or poor collaboration.
- **Conflicting Goals:** Private companies seek profit, whereas governments prioritize public welfare, creating potential misalignment.
- **Corruption Risks:** Complex procedures and involvement of many stakeholders increase the scope for unethical practices.
- **Political and Legal Uncertainty:** Changes in government policies or regulations can disrupt PPP projects and negatively impact progress.

**Public-private partnership projects in agriculture and allied sectors in India****Project Golden Ray**

This project is a PPP between the Rajasthan government and Monsanto India Limited (MIL) aimed at improving the economic condition of tribal maize growers by increasing yields and incomes in five districts-Banswara, Dungarpur, Udaipur, Pratapgarh and Sirohi. Launched in Kharif 2009, the project promoted hybrid maize seeds and supplied around 90 MT of MIL's "Prabal" and "Hi-Shell" seeds to nearly 19,000 farmers, resulting in almost double the usual yields in districts like Banswara and Udaipur. The initiative later expanded to Rabi with additional hybrid seed distribution, covering over 30,000 tribal farmers with a total expenditure of ₹1.57 crore. By 2010, the scheme scaled up to include about 35% of the maize-growing area in tribal regions, providing hybrid seed and, for tribal BPL farmers, free fertilizers, with technical support deployed to assist farmers (Benjongtoshi *et al.* 2021)<sup>[6]</sup>.

**e-Choupal**

ural communities often struggle to access technology, markets, and government services due to limited

information and weak extension support. To bridge this gap, ITC's Agri Business Division launched the *e-Choupal* initiative in 2000, creating a more efficient and transparent supply chain for farmers. Through village-level internet kiosks managed by trained farmers (sanchalakhs), e-Choupal provides real-time mandi prices, best-practice farming advice, and access to quality inputs, enabling farmers to negotiate directly with ITC and secure better returns. Each kiosk serves about 600 farmers across several nearby villages. Today, around 6,500 e-Choupals operate in 40,000 villages across 10 states, benefiting nearly 4 million farmers, with plans to expand to 20,000 kiosks covering 100,000 villages and 15 million farmers (Benjontoshi *et al.* 2021) [6].

#### **GALVmed (Global Alliance for Livestock Veterinary Medicines)**

ALVmed, a UK-based nonprofit public-private partnership headquartered in Edinburgh, focuses on developing and delivering livestock health products for smallholder farmers. Its South Asia office collaborates with government and non-government agencies to improve access to affordable animal health solutions for rural livestock keepers. In India, GALVmed currently operates in the states of Odisha, Bihar, West Bengal, Assam, Nagaland, and Jharkhand (Bafanda & Khandi 2018) [4].

#### **Mahyco-DBT partnership on plant genomics.**

Under the Agriculture Biotechnology Support Programme (ABSP-II), Mahyco, IIVR, UAS Dharwad, and TNAU Coimbatore collaborated to develop transgenic brinjal resistant to fruit and shoot borer. ABSP funded the project, DBT supported regulatory processes, Mahyco supplied the cry gene, and IIVR led varietal development. Brinjal transformation began in 2000, and TNAU carried out confined field trials of Bt brinjal during 2007-08 (Ponnusamy, K. 2013) [14].

#### **PPP for agricultural extension**

Madhya Pradesh initiated a PPP in agricultural extension on 5 November 2001, involving MANAGE, the state Department of Agriculture, and Dhanuka Agritech. The collaboration aimed to raise farm productivity and improve farmers' livelihoods by offering soil testing, training, exposure visits, demonstrations, technology dissemination, agricultural events, market support, and credit facilities, along with services through cyber dhabas (Marbaniang *et al.* 2020) [11].

#### **Project Sunshine**

The Tribal Development Department of Gujarat partnered with Monsanto to supply hybrid seeds to small and marginal farmers in remote areas under Project Sunshine. Initially launched as Project Rainbow in 2007 across 300 villages of Dahod and Panchmahal, the government purchased seeds from private companies and distributed them with support from dairy cooperatives and NGOs. The project aimed to double farmers' incomes within five years. By 2011, it expanded to 20 talukas in five districts-Banaskantha, Dahod, Panchmahal, Sabarkantha, and Vadodara-benefiting about 2.25 lakh farmers (Shukla *et al.* 2016) [15].

**Bovine brucellosis and tuberculosis eradication arrangements:** Australia's Brucellosis and Tuberculosis

Eradication Campaign (BTEC) began in 1970, initially fully planned and funded by the government. Over time, the cattle industry took an active role in planning, management, and financing, contributing about half the costs by the 1980s. A new BTEC Committee in 1984 ensured industry representation and joint decision-making on responsibilities and expenses. The collaboration between government and industry led to the successful eradication of bovine brucellosis in 1989 and bovine TB in 1997, completing a program that cost around Aus\$1 billion over 30 years (Black 2012) [7].

#### **PPP for organic production**

In Uttarakhand, Kohinoor Foods Ltd (KFL) partnered with the state-run Uttarakhand Organic Commodity Board (UOCB) and a farmers' federation to promote organic Basmati rice. Launched in 2004, UOCB handled certification and internal controls, while the federation procured paddy from farmers, paying mandi charges and distributing payments. This arrangement increased farmers' income by about Rs. 235 per ton, improved yields, reduced production costs, and gave KFL a profit of Rs. 245 per ton, a portion of which supported farmer extension services. Subsidies from UOCB and opportunities for farmers to earn from weighing and bagging further boosted earnings. The project grew from 190 farmers on 119 acres in 2005 to 864 farmers on 748 acres by 2007 (Singh, S. 2015) [16].

#### **PPP in poultry sector in Ethiopia**

Since 2010, Ethiopia has implemented a PPP to develop the poultry sector, involving EthioChicken and the public Veterinary Services. EthioChicken produces hybrid day-old chicks, which grower agents raise to 45 days with proper healthcare before distribution to smallholder farmers through a network supported by the Ministry of Livestock and Fisheries. The project expanded in phases from Tigray to four additional regions, with EthioChicken managing government farms, hatcheries, and a feed mill. The initiative boosted local economies through farm rentals, employment creation, and new incomes, while increasing national poultry production-EthioChicken supplied 13 million day-old chicks in 2018, covering nearly one-third of Ethiopia's total production (N'Guessan *et al.* 2022) [13].

#### **Karuna Animal Ambulance Services (KAAS) - Gujarat**

The Karuna Animal Ambulance service was launched in Gujarat on 6 October 2017 with 11 ambulances for stray animal welfare and expanded statewide in 2018 with 26 more vehicles. Building on its success, the 10MVD initiative-one Mobile Veterinary Dispensary per 10 villages-was launched in June 2020 with 108 MVDs in Gandhinagar, aiming to expand to 460 MVDs covering over 4,600 villages and providing health care to more than 3.5 crore livestock. Currently, 410 MVDs operate alongside Karuna Ambulances, having treated over 3.45 lakh animals by May 2021 (Anonymous<sup>b</sup>).

#### **Challenges in public-private partnerships (PPPs)**

- Conflicting organizational cultures and objectives among partners
- Weak institutional support and enabling environment
- Insufficient political and legal frameworks
- Ineffective systems for sharing risks and responsibilities
- Poor processes for selecting suitable PPP partners

- Mismatch between resources invested and service quality
- Limited monitoring and evaluation of PPP activities
- Lack of transparency in operations
- Challenges inherent to the PPP model itself

(Batjargal & Zhang 2021) [5].

### Future prospects of PPP in agriculture and animal husbandry

#### Agriculture Sector

- **Efficiency & Productivity:** PPPs enhance farm efficiency by leveraging public and private expertise and resources.
- **Risk Management:** Shared responsibility reduces climate, pest, and market risks.
- **Infrastructure Development:** Supports irrigation, storage, and transport facilities.
- **Innovation & Technology:** Accelerates adoption of modern technologies, including AI, for optimized farming.
- **Market Access & Value Chains:** Connects farmers with processors, distributors, and markets.
- **Capacity Building:** Trains farmers in modern and sustainable practices.
- **Sustainable Practices:** Promotes environmentally friendly farming methods.

#### Animal Husbandry Sector

- **Disease Management:** Strengthens veterinary services through joint surveillance, vaccination, and diagnostics.
- **Technology Adoption:** Supports advanced farming techniques and innovation.
- **Processing & Value Addition:** Establishes meat, dairy, and other product facilities.
- **Genetics & Breeding:** Develops disease-resistant, high-yield breeds suited to local conditions.
- **Nutrition & Fodder Development:** Improves feed quality and tackles fodder shortages.
- **Market Access & Exports:** Expands domestic and international markets by ensuring quality and compliance.

### Conclusion

Public-Private Partnerships (PPPs) can serve as an effective tool to accelerate development in agribusiness and agricultural infrastructure. With the ongoing economic reforms and globalization, the potential for PPPs is vast and likely to expand in the future. The government is focused on creating a conducive environment for private investment in infrastructure through the PPP model. Achieving India's goal of doubling farmers' incomes will require substantial investment in agriculture and allied sectors, making it essential to actively engage the private sector through well-structured PPP initiatives.

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