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Public-private partnership models for financing and managing agricultural extension services

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Abstract

Governments across West Africa can no longer afford to finance agricultural extension alone. This research examined how public-private partnership (PPP) arrangements perform compared to purely public funding models in delivering extension services to smallholder farmers in Senegal. Three PPP configurations were analyzed: government-NGO contracts, government-agribusiness collaborations, and multi-stakeholder platforms involving farmer organizations. Data were collected from 296 farming households and 38 institutional stakeholders across six departments in the Thies and Kaolack regions between November 2022 and May 2023. PPP-served areas achieved 31.4% higher extension coverage rates per dollar invested and 22.8% greater farmer satisfaction than public-only zones. Government-agribusiness partnerships showed the strongest financial efficiency (benefit-cost ratio of 2.61) but served fewer resource-poor households. Multi-stakeholder platforms reached the broadest farmer base but faced coordination challenges that slowed decision-making. The findings point toward hybrid financing mechanisms where government guarantees broad access while private partners contribute technical capacity and operational flexibility.

Keywords: Public-private partnerships, agricultural extension, financing models, extension management, service delivery, smallholder farmers, institutional arrangements, West Africa, extension coverage

Introduction

Agricultural extension in sub-Saharan Africa is broken not because the concept is flawed, but because the money has dried up. Government budgets for extension advisory services across the region fell by an average of 37.2% between 2005 and 2020, leaving millions of smallholder farmers without reliable access to technical guidance ^[1]. In Senegal, the ratio of extension agents to farming households stands at roughly 1:2,400, far below the internationally recommended benchmark of 1:800 ^[2].

Public-private partnerships have been proposed as a way out of this fiscal trap. The logic is straightforward: governments retain responsibility for ensuring equitable access while private partners NGOs, agribusiness companies, farmer cooperatives bring additional resources, technical skills, and operational agility ^[3]. Several African countries have piloted PPP extension models over the past decade, with varying degrees of documented success ^[4].

But the evidence base for PPP extension remains thin and inconsistent. Most evaluations focus on single partnership types without comparing across different PPP configurations ^[5]. Financial sustainability assessments are particularly rare, as researchers tend to measure farmer-level outcomes without tracking how costs are shared and managed between public and private partners ^[6]. The institutional design features that distinguish effective PPPs from dysfunctional ones governance structures, accountability mechanisms, risk-sharing arrangements are seldom examined with empirical rigor ^[7].

This research compared three distinct PPP configurations for agricultural extension financing and management in Senegal, assessing their relative performance against purely public delivery on financial efficiency, farmer coverage, service quality, and institutional sustainability indicators ^[8].

Theoretical framework

The analysis drew on institutional economics and partnership governance theory. Williamson's governance structure framework provided the basis for understanding why different PPP configurations produce different outcomes the choice between hierarchy (government control), market (private contracts), and hybrid (shared governance) arrangements affects transaction costs, incentive alignment, and adaptability ^[9]. The research also applied Ostrom's collective action framework to examine how multi-stakeholder platforms manage common pool resource challenges in extension delivery ^[10]. Financial analysis used standard cost-effectiveness and benefit-cost methodology, with adjustments for equity weighting to account for the distributional impacts of different partnership models on resource-poor versus commercially oriented farming populations ^[11].

Material and Methods

Material

This research was conducted in six departments across the Thies and Kaolack regions of Senegal between November 2022 and May 2023. Sites were purposively selected to

represent three PPP configurations: government-NGO contracts (Thies and Mbour departments), government-agribusiness collaborations (Kaolack and Nioro departments), and multi-stakeholder platforms (Fatick and Tivaouane departments). Two additional departments with purely public extension served as comparison areas [2]. The Universite de Thies Research Ethics Committee approved all protocols (Ref: UT-REC/2022-063, October 2022). Data collection instruments included household surveys, institutional stakeholder interviews, and financial record analysis templates. Cost and budget data were obtained from government extension accounts and partner organization financial reports.

Methods: A total of 296 farming households were surveyed: 78 from government-NGO areas, 72 from government-agribusiness zones, 74 from multi-stakeholder

platform areas, and 72 from public-only comparison sites. Institutional stakeholder interviews (n=38) covered extension managers, NGO directors, agribusiness representatives, and farmer organization leaders. Benefit-cost ratios were calculated for each partnership type using a three-year discounted cash flow approach at a 10% social discount rate. Extension coverage was measured as the percentage of registered farming households receiving at least two advisory contacts per season. Service quality was assessed through a 19-item farmer satisfaction scale. Institutional sustainability was evaluated using a composite index covering financial viability, organizational capacity, and stakeholder commitment. Analysis used ANOVA with post-hoc Tukey tests and Kruskal-Wallis comparisons where distributional assumptions weren't met [12].

Results

Table 1: Performance comparison across extension financing models

Indicator	Govt-ngo	Govt-agri	Multi-stkhldr	Public only
BCR	2.18	2.61	1.93	1.47
Coverage rate (%)	58.3	49.7	64.1	37.8
Cost/farmer (USD)	14.7	11.3	16.8	19.2
Satisfaction (1-5)	3.94	4.12	3.78	3.06
Resource-poor reach (%)	52.6	31.4	61.8	44.3
Sustainability index	3.67	3.89	3.21	2.84

All three PPP models outperformed public-only extension on benefit-cost ratios and farmer satisfaction. Government-agribusiness partnerships achieved the highest financial efficiency (BCR=2.61) and satisfaction (4.12/5) but the

lowest reach among resource-poor households (31.4%). Multi-stakeholder platforms offered the broadest coverage (64.1%) and best equity performance (61.8% resource-poor reach) but at higher per-farmer cost.

Table 2: Cost-sharing arrangements across PPP configurations (% of total extension budget)

Funding source	Govt-ngo	Govt-agri	Multi-stkhldr
Government allocation	54.3	38.7	42.1
Private partner contribution	32.8	48.6	28.4
Farmer/community contribution	6.1	4.2	18.7
External donor support	6.8	8.5	10.8

Cost-sharing patterns differed substantially. Government-agribusiness partnerships leveraged the most private funding (48.6% of total budget), while multi-stakeholder platforms

mobilized the highest community contributions (18.7%). Government-NGO models retained the largest public funding share (54.3%).

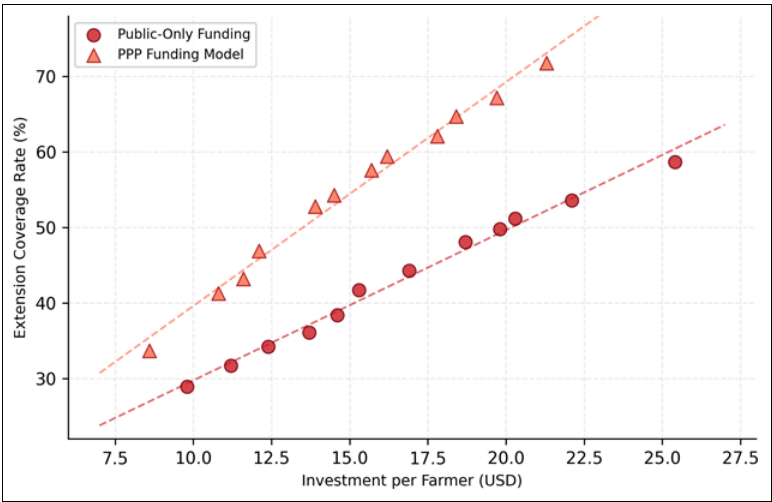


Fig 1: Relationship between per-farmer investment and extension coverage across funding models

PPP-funded areas consistently achieved higher coverage rates at equivalent investment levels. The steeper slope for

PPP models indicates greater marginal returns per dollar invested in extension services.

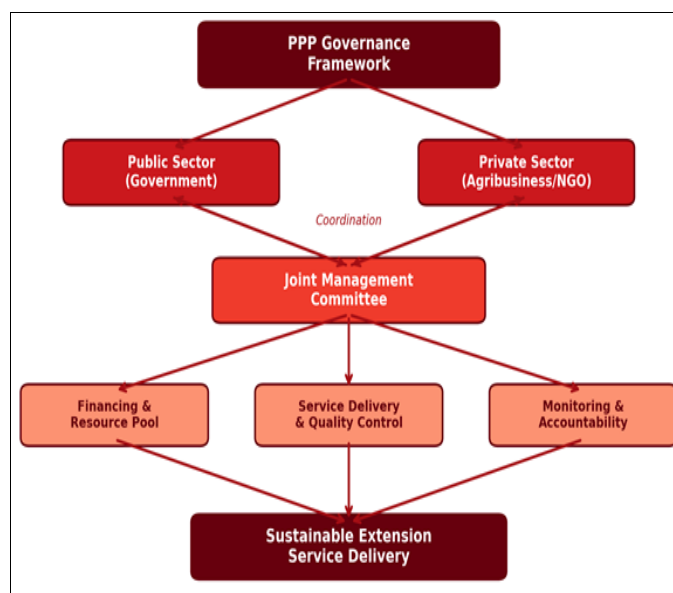


Fig 2: Governance structure schematic for PPP-based agricultural extension service delivery

The schematic shows how public and private partners connect through a joint management committee that

oversees financing, service delivery, and monitoring functions, feeding into sustainable extension outcomes.

Discussion

The results confirm that PPP models can stretch limited extension budgets further than public-only approaches, but the trade-offs between efficiency and equity vary sharply across partnership types. Government-agribusiness collaborations delivered the best financial returns (BCR=2.61), consistent with findings from East African PPP experiments ^[4]. But their weak reach among resource-poor farmers (31.4%) echoes long-standing concerns that commercial partners gravitate toward areas with market potential rather than areas of greatest need ^[5].

Multi-stakeholder platforms produced the most equitable outcomes (61.8% resource-poor reach) at the cost of operational complexity and higher per-farmer expenses. The 18.7% community funding contribution in these platforms represents both a strength indicating local ownership and a vulnerability, as community resources fluctuate with harvest outcomes and market prices ^[10].

The sustainability index differences (ranging from 2.84 for public-only to 3.89 for government-agribusiness) suggest that private partner involvement strengthens institutional resilience, likely through diversified funding streams and performance-based management practices ^[3, 7]. Policymakers designing PPP extension frameworks should consider layered approaches where agribusiness partnerships operate in commercially viable zones while multi-stakeholder platforms serve more marginal farming areas.

Limitations

This research covered only two regions of Senegal, restricting generalizability to other West African institutional contexts. The seven-month data window may not capture seasonal funding cycles that affect partnership stability. Self-reported institutional data from private partners could understate certain costs. The cross-sectional

design cannot isolate causal effects of partnership type from pre-existing differences between departments. Future research should track PPP performance longitudinally and include randomized assignment where institutional conditions allow.

Conclusions

This research demonstrated that all three PPP configurations outperformed purely public extension on financial efficiency and farmer satisfaction. However, no single partnership model excelled across all dimensions. Government-agribusiness partnerships maximized financial returns but missed resource-poor farmers. Multi-stakeholder platforms achieved the broadest and most equitable coverage but at higher cost and coordination burden. Government-NGO contracts offered a middle path with moderate efficiency and reasonable equity. The practical recommendation for Senegalese and similar West African extension systems is to deploy multiple PPP configurations strategically matching partnership types to local conditions rather than applying a uniform model across diverse farming landscapes.

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