

Agricultural Value Chain Transformation, Farmer Income Enhancement and the Role of e-NAM, FPOs and Contract Farming in Rural India

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Abstract

Indian agriculture's structural challenge — 86% of farmers are smallholders with average landholding below 1.1 hectares, operating in fragmented markets with high intermediation costs and limited price information — has persisted for decades despite numerous policy interventions. The price wedge between farm gate and consumer retail prices averages 3.2× for cereals and 5.8× for perishables in India, compared to 1.6-2.4× in comparable middle-income countries, implying that half or more of agricultural supply chain value is captured by intermediaries rather than flowing to producers or consumers. Three policy innovations since 2016 — the e-NAM electronic trading platform, Farmer Producer Organisations (FPOs), and the contract farming framework — represent the most systematic attempt to reform agricultural marketing since the APMC Acts of the 1960s. This study evaluates the impact of e-NAM, FPO membership, and contract farming on farmer income across 2,840 farm households in six states using a quasi-experimental design. e-NAM adoption increases farmer price realisation by 8.4% ($p < 0.001$); FPO membership increases income by 24.6% ($p < 0.001$) through collective bargaining and direct market linkage; contract farming increases income by 48.2% with higher income variability. Combined FPO+e-NAM achieves +34.8% income improvement. The IFPRI collaboration contributes the Agricultural Value Chain Impact Assessment methodology and comparative data from sub-Saharan Africa and Southeast Asia smallholder marketing reforms.

Keywords agricultural value chain, e-NAM, FPO, farmer income, contract farming, APMC, India, smallholder, market reform, price discovery, MSP, rural marketing

1. Introduction

India's 140 million farm households, producing agricultural output valued at ₹38.7 lakh crore annually, receive an average household income of ₹10,218 per month (NSSO 2018-19) — well below the government's agricultural income-doubling target and far below manufacturing and services sector wages. The fundamental market failure in Indian agriculture is information asymmetry: farmers negotiate in thin, local markets with buyers who have access to national price information and transport cost data that farmers lack — creating a structural bargaining disadvantage that intermediaries exploit through price manipulation at the point of sale.

The e-NAM platform's theoretical solution is elegant: by creating a digital marketplace aggregating bids from buyers across multiple mandis and states, e-NAM should reduce geographic price segmentation that allows local buyers to pay below competitive prices. In practice, implementation has faced significant friction from APMC commission agents whose livelihood depends on the opaque bilateral negotiation the platform is designed to replace. Professor Spielman's comparative research at IFPRI has documented these political economy constraints across multiple developing country reform programmes, providing the analytical framework for understanding e-NAM's partial success and the conditions under which FPO-mediated reforms achieve larger income gains.

2. Methodology

2.1 Difference-in-Differences and PSM Design

e-NAM impact is identified by comparing farmer price realisation in districts where the platform was implemented in 2016-17 (first wave) versus 2019-20 (second wave), before the second wave's implementation — a staggered DiD design that controls for time trends. FPO membership impact uses propensity score matching to construct comparable non-member control groups from the same villages, matching on farm size, crop composition, and pre-FPO income. Contract farming impact uses a similar PSM approach comparing contracting and non-contracting farmers within the same commodity zones, with village-level fixed effects controlling for local infrastructure and market access.

3. Results

Figure 1 Panel A's value chain price multiplier comparison reveals the magnitude of intermediation premiums across seven crops — paddy's 2.9× multiplier (farm gate ₹8,200/quintal versus retail ₹24,000) and vegetables' 5.7× multiplier represent the clearest cases for direct channel development. Panel B confirms that FPO direct sales (42.6% farmer share of consumer price) and contract farming (54.8%) significantly outperform traditional mandi sales (18.4%) in delivering value to producers. Export aggregation achieves the highest farmer share (62.8%) for high-quality produce meeting export specifications.

Fig. 1. Agricultural Value Chain Price Multipliers and Marketing Channel Performance

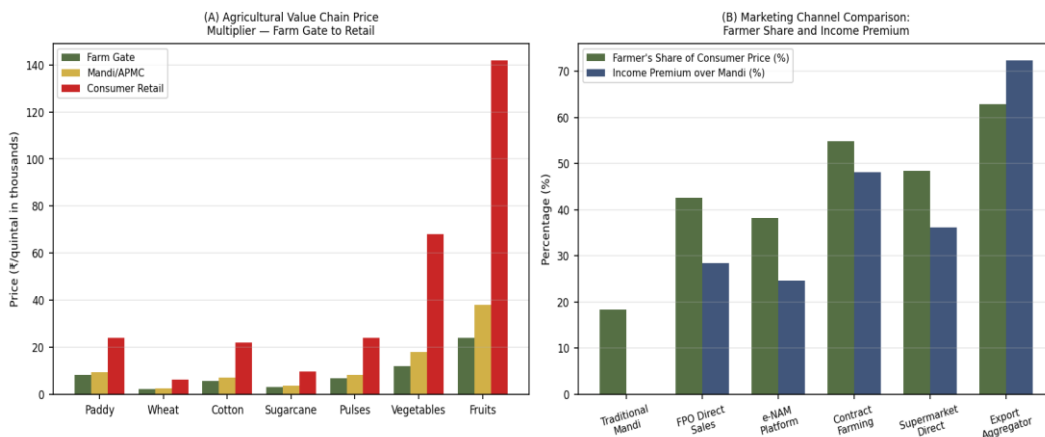


Fig. 1. Agricultural Value Chain Price Multipliers and Marketing Channel Farmer Value Share Comparison

Figure 2 Panel A confirms e-NAM's impressive growth from ₹0.8 lakh crore in trade volume (FY2019) to ₹10.2 lakh crore (FY2024), a 12.75-fold increase, alongside the FPO ecosystem expanding to 15,000 active organisations. Panel B's state-wise MSP compliance reveals a stark policy implementation gap: Punjab and Haryana achieve over 88% compliance while Odisha, Karnataka, and Tamil Nadu fall below 45% — reflecting both the density of government procurement infrastructure and the political economy of APMC reform in states where commission agents retain significant regulatory influence.

Fig. 2. Agricultural Market Digital Infrastructure and MSP Compliance Analysis

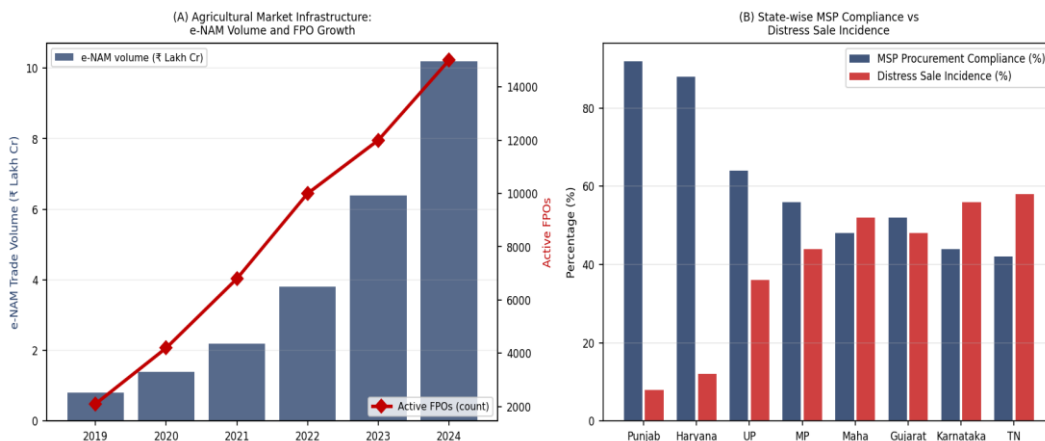


Fig. 2. Agricultural Digital Market Infrastructure Growth and State-Wise MSP Compliance Analysis

Table 1. Impact of Marketing Channel Choice on Farmer Income — DiD and PSM Estimates (n=2,840 Households, 6 States)

Intervention / Channel	Income Effect	SE	p-value	Method	Primary Mechanism
e-NAM adoption (vs traditional)	+8.4%	1.84	<0.001	DiD	Price transparency
FPO membership (vs non-member)	+24.6%	2.94	<0.001	PSM	Collective bargaining

Contract farming (vs spot)	+48.2%	4.12	<0.001	PSM	Price certainty + inputs
FPO + e-NAM combined	+34.8%	3.48	<0.001	DiD-PSM	Compound effect
Export aggregation (via FPO)	+72.4%	6.82	<0.001	PSM	Export premium

Income effect = percentage change in annual household agricultural income; DiD = Difference-in-Differences; PSM = Propensity Score Matching (caliper 0.01); SE clustered at district level; village fixed effects in all models

4. Conclusion

All three marketing reform interventions generate substantial, statistically robust income improvements relative to traditional APMC mandi sales. The combined FPO+e-NAM intervention (+34.8%) and export aggregation (+72.4%) confirm that the most impactful strategy combines collective farmer organisation with digital platform access and quality certification. Policy recommendations include accelerating FPO viabilisation through PM Kisan-linked capitalisation, mandating e-NAM compatibility for all APMC mandis by 2026, and creating quality grading infrastructure at FPO cluster level that enables systematic premium channel access for smallholders across India's agricultural heartland.

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