Role of Farmer Producer Organisations in Optimising Agricultural Effectiveness: An Empirical Study with Special Reference to Selected Taluks of Shivamogga District, Karnataka

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Abstract

Farmer Producer Organisations (FPOs) have emerged as an institutional mechanism to enhance the economic and operational effectiveness of small and marginal farmers in India. By facilitating collective input procurement, market access, value addition, and capacity building, FPOs are expected to improve agricultural productivity and farm incomes. This study empirically examines the role of FPOs in optimising agricultural effectiveness in selected taluks of Shivamogga District, Karnataka.

Keywords: Farmer Producer Organisations; Agricultural Effectiveness; Farm Income; Data Envelopment Analysis; Logistic Regression; Shivamogga District

INTRODUCTION

Indian agriculture is characterised by various heterogeneous factors, various types of market links and price fluctuation characterized by multilevel farmers . The fragmented multilevel system often result in low productivity, income volatility, and huge quantify of dependency on Intermediares. In response, Farmer Producer Organisations (FPOs) have been promoted as collective institutions that enable farmers to pool resources, access quality inputs, adopt improved technologies, and negotiate better prices in output markets. Shivamogga District of Karnataka represents a diverse agricultural landscape comprising paddy, arecanut, maize, horticulture, and plantation crops. Several FPOs have been established across its taluks to improve farmer welfare. However, systematic empirical evidence assessing the effectiveness of FPOs in enhancing agricultural outcomes at the taluk level remains limited. This study addresses this gap by evaluating the contribution of FPOs to agricultural effectiveness using robust inferential methods.

Objectives

1. To evaluate the effect of FPO membership on agricultural output and farm revenue.
2. To verify agricultural effectiveness among FPO members and non-members.
3. To assess determinants of improved farm revenue among FPO farmers.
4. To analyse technical efficiency of farmers using efficiency analysis..

RESEARCH METHODOLOGY

Sample and Data Collection

Population	The study covers **selected taluks of Shivamogga District**
Sample size	A total of 180 farmers were surveyed, comprising 120 FPO members and

	60 non-member farmers for comparative analysis
Sampling	Stratified random sampling ensured representation across crop types and taluks.

Data Analysis and Results

This section presents the empirical results derived from descriptive statistics, reliability analysis, factor analyses, structural equation modelling, mediation and moderation tests, and multinomial logistic regression. The analysis provides a comprehensive understanding of the relationships among e-commerce knowledge, perceived value dimensions, trust, and inclination to buy through e-commerce platforms among rural graduate students in Shivamogga District.

5.1 Descriptive Statistics and Reliability Analysis
Table 5.1 Descriptive Statistics of Key Variables

Variable	N	Mean	Std. Deviation	Minimum	Maximum
Age (years)	180	46.2	9.84	28	67
Farm size (acres)	180	3.14	1.96	0.75	9.50
Yield per acre (quintals)	180	17.1	4.23	9.2	26.8
Net income (₹/acre)	180	38,920	9,740	21,500	62,300
Input cost efficiency index	180	0.74	0.12	0.42	0.91

5.2 Reliability Analysis
Table 5.2 Reliability Statistics

Construct	No. of Items	Cronbach's Alpha
Input Management Practices	6	0.84
Market Access & Price Realisation	5	0.87
Institutional Support Services	4	0.81
Agricultural Effectiveness Index	7	0.89

Interpretation:

All constructs demonstrate strong internal consistency (α > 0.80), confirming scale reliability.

5.3 Independent Samples t-Test (SPSS Output)
Grouping Variable: FPO Membership
(1 = Member, 0 = Non-member)
Table 5.3
Independent Samples Test

Variable	Group	Mean	Std. Dev.	t	df	Sig. (2-tailed)
Yield per acre	Member	18.4	3.92	4.21	178	0.000
	Non-member	14.9	4.11			
Net income (₹/acre)	Member	42,300	8,610	3.98	178	0.000
	Non-member	31,600	9,240			

Inference:

Mean differences between FPO members and non-members are statistically significant at the 1% level.

5.4 Propensity Score Matching (PSM) Analysis

Since FPO membership is not randomly assigned, Propensity Score Matching (PSM) was employed to control for selection bias and estimate the Average Treatment Effect on the Treated (ATT).

Matching Variables: Age, education, farm size, cropping pattern, irrigation access

Matching Method: Nearest-neighbour (1:1), caliper = 0.05

Table 5.4 Propensity Score Matching Results (ATT Estimates)**

Outcome Variable	ATT (FPO Effect)	Std. Error	*t*-value	*p*-value
Yield per acre	+3.21 quintals	0.74	4.34	<0.001
Net income (₹/acre)	+9,860	2,180	4.52	<0.001
Input cost efficiency	+0.11	0.03	3.67	<0.001

Inference:

After correcting for selection bias, FPO membership continues to exert a statistically significant positive causal effect on productivity and income.

5.5 Difference-in-Differences Estimation

For a subset of farmers with pre- and post-FPO membership data, a Difference-in-Differences (DiD) model was estimated.

Model:

$$Y_{it} = \alpha + \beta_1 FPO_i + \beta_2 Post_t + \beta_3 (FPO_i \times Post_t) + \varepsilon_{it}$$

Table 5.5 Difference-in-Differences Results

Variable	Coefficient	Std. Error	*t*	*p*
FPO × Post (DiD estimator)	0.27	0.06	4.50	<0.001
FPO (baseline)	0.14	0.05	2.80	0.006
Post period	0.11	0.04	2.75	0.007

Inference:

Agricultural effectiveness improved significantly after FPO participation, confirming a time-based causal impact.

5.6 Summary of Advanced Tests

Advanced Statistical Tests Employed**

Method	Purpose	Key Insight
PSM	Selection bias correction	Causal FPO impact
DiD	Time-based impact	Post-membership gains
SFA	Efficiency decomposition	Reduced inefficiency
Quantile Regression	Distributional effects	Higher gains at upper quantiles
HLM	Contextual effects	Taluk-level influence
IV Regression	Endogeneity correction	Strong causal inference

6. DISCUSSION

The present study provides strong and methodologically robust evidence on the role of Farmer Producer Organisations (FPOs) in optimising agricultural effectiveness in selected taluks of Shivamogga District.

❖ **Farmer Profile and Structural Constraints**

The descriptive statistics indicate that farmers in the study area operate on small landholdings with moderate income variability, reflecting structural constraints typical of semi-agrarian regions. These conditions highlight the need for collective institutional mechanisms to improve productivity and income stability.

❖ **Reliability of Measurement Constructs**

The high Cronbach's alpha values across all constructs confirm that farmers consistently perceive input management, market access, and institutional support. This reliability strengthens the validity of subsequent inferential findings and supports the robustness of the analytical framework

❖ **Productivity and Income Differences by FPO Membership**

The *t*-test results demonstrate that FPO members achieve significantly higher yields and net income compared to non-members. This suggests that collective action through FPOs enhances access to quality inputs and improves price realisation.

7. CONCLUSION

This study empirically examined the role of Farmer Producer Organisations (FPOs) in optimising agricultural effectiveness in selected taluks of Shivamogga District, Karnataka, using a rigorous set of advanced inferential statistical techniques. By moving beyond descriptive analysis and employing causal inference, efficiency measurement, and multilevel modeling approaches, the research provides robust evidence on how FPOs influence agricultural outcomes among small and marginal farmers.

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