

FARM PRODUCTIVITY AND EFFICIENCY UNDER CONTRACT FARMING: A STUDY OF RICE SEED CULTIVATION IN SOUTHERN INDIA

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OUTLINE

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INTRODUCTION

- ❖ **Low productivity**
- ❖ **High Cost of Cultivation**
- ❖ **Weak Market Integration**
- ❖ **Need for better Institutional arrangements**
- ❖ **Emergence of Contract Farming**
- ❖ **The argument for promoting contract farming:
Increase the agricultural productivity and output growth (**Eaton and Shepred 2001; Kumar, 2006; Key and Rusten, 1999**)**

Three Linkage

- ❖ **Input Linkage**
- ❖ **3 Technological Linkage**
- ❖ **Output Linkage**

OBJECTIVES

- **To examine productivity difference among contract and non-contract crop.**
- **To assess the farm level technical efficiency for both contract and non-contract crop and determinants of technical efficiency.**

REVIEW OF LITERATURE

➤ Although contract farming is better institutional arrangement, it is expected to increase the productivity and efficiency level (**Bauman, 2000; Eaton et al. 2001**)

➤ Productivity and Contract Farming

➤ Productivity of contract farmers is higher than the non-contract farmers (**Kumar, 2006; Ramswami et al. 2005; Dileep et al. 2002; Chang et al. 2006; Key and McBride, 2003**).

No productivity difference between contract and non-contract farmers (**Kumar, 2006**)

Efficiency and Contract Farming

➤ Contract farmers are more efficient than the non-contract farmers (**Ramswami et al. 2005; Chang et al. 2006; Kumar, 2006**)

● ➤ Large Framers are more efficient (**Delgado, et al. 2003**)

● ➤ Contract farmer use resource efficiently (**Dillep et al. 2002**)

EMPIRICAL MODEL

- ❖ Cob-Douglas Production function

- ❖ Model 1

$$\ln Q = \ln \alpha + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_5 + \beta_5 \ln X_5 + \beta_6 X_6 + \varepsilon_i$$

- ❖ Model 2

$$\ln Q = \ln \alpha + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_5 + \beta_5 \ln X_5 + \beta_6 X_6 + B_7 X_7 + \varepsilon_i$$

- ❖ Stochastic Production Frontier Approach

DATA AND VARIABLE CONSTRUCTION

- Karim Nagar, Andhra Pradesh
- Rice seed contract production
- 86 contract farm households surveyed but 81 selected for this analysis.
- Contract and non-contract crop under contract farmer
- **Variable Construction**
 - Output = Total output produced in reporting season (quintal)
 - Land= Total land under particular crop
 - Labour = Number of days of labour (family labour and hired labour) actually used
 - Power = Total cost of power (animal and machine)
 - Manure = Total amount (quantity) of manure used
 - Chemicals = Total expenditure on Chemicals

RESULT AND DISCUSSION

❖ Cost of Cultivation

- **The present study adapted the methods followed by farm management studies in India (Sen and Bhatia, 2004)**
- **There is difference in costs and returns between contract and non-contract crop.**
- **Rental value of land constituted around 17 per cent of total costs for contract crop and 22 per cent for non-contract crop.**

Cost of human labour, animal and machine power constitutes the major costs of total cost for the contract crop while only cost of animal and machine power constitute the major cost for the non-contract crop.

CONTI....

❖ **The cost of chemicals and manure per acre use for the contract crop is 45 per cent higher than the non-contract crop.**

❖ **The cost of growing contract crop per acre is 31 per cent higher than the non-contract crop.**

Per acre gross return from the contract crop is two times more than the non-contract crop.

❖ **The benefit costs ratio over total costs is higher for the contract crop.**

PRODUCTIVITY

- ❖ **Land, manure, and region have shown a significant contribution to the output of the contract crop**
- ❖ **Land, power, chemical and region have shown significant contribution to the output of non-contract crop.**

There is productivity difference between contract and non-contract crop.

- ❖ **The result shows that the output per cropped is on an average, 19 per cent higher for contracted crop as compared to non-contract crop.**

OLS ESTIMATES OF AVERAGE PERFORMANCE USING COBB-DOUGLAS PRODUCTION FUNCTION FOR SAMPLE FARMERS

Variables	Rice Seed	Rice	Aggregate ^a
Constant	0.51 (0.31)	0.93 (0.84)	1.06 (0.96)
Land	0.57 (2.04)**	0.78 (373)*	0.77 (4.38)*
Labour	0.19 (0.82)	-0.12 (-0.63)	0.016 (0.11)
Power	0.05 (0.99)	0.15 (2.11)**	0.08 (1.68)**
Manure	0.07 (1.67)***	0.01 (0.68)	0.01 (0.97)
Chemical	0.05 (0.55)	0.19 (1.63)***	0.11 (1.60)***
Region	0.04 (3.35)*	-0.02 (-1.64)***	0.01 (0.97)
Dummy Contract =1, Non-Contract = 0			0.19 (1.60)***
Adjusted R ²	0.95	0.96	0.95
No of Observation	81	81	162
F	0.00	0.00	0.00

Note: The standard errors are robust

*, **, *** shows the significant level at one, five and ten per cent level respectively

() shows the t-value

In this equation both contract and non-contract crop pooled and keep contract dummy as independent variable.

TECHNICAL EFFICIENCY

- ❖ **Measurement of technical efficiency through half-normal and exponential maximum likelihood methods give similar results.**
- ❖ **The present study reports half-normal because it is slightly tighter than exponential (Kumbhakar et al. 2006).**

- ❖ **There is a variation in efficiency across crops (contract and non-contract crop)**

Mean efficiency 89 per cent is observed for the contract crop and 82 per cent for the non-contract crop.

- ❖ **12 Around 56 per cent of farmers could be able to achieve 91 to 100 per cent of the output in most technically efficient way in growing contract crop, whereas it is only around 22 per cent in case of non-contract crop.**

TECHNICAL EFFICIENCY IN STOCHASTIC PRODUCTION FRONTIER

Technical Efficiency (%)	Contract Farmer	
	Rice Seed	Rice
41-45		1 (1.2)
46-50		
51-55	1 (1.23)	
56-60	1 (1.23)	
61-65	1 (1.23)	
66-70	1 (1.23)	6 (7.4)
71-75		11 (13.6)
76-80	2 (2.47)	9 (11.1)
81-85	11 (13.58)	22 (27.2)
86-90	19 (23.46)	14 (17.3)
91-95	30 (37.04)	11 (13.6)
96-100	15 (18.52)	7 (8.6)
Total	81	81
Mean	88.98	82.35
Variance	71.31	98.27

Difference = 6.63*

Note: * Shows the significant at one per cent level

AVERAGE TECHNICAL EFFICIENCY ACROSS FARM SIZE

Farm Size	Contract Crop	Non-Contract Crop
1 Acres (Large)	90.13	81
1.01-2 Acres (Medium)	89.50	82.3
2.01 Acres (Small)	87	82

DETERMINANTS OF TECHNICAL EFFICIENCY

- ❖ **Technical efficiency is assumed to depend on factors which determine the individual's technical knowledge and understanding, and the socio-economic environment in which he is working (Kalirajan, 1994).**
- ❖ **Factors affecting the efficiency of the sample farmers, therefore, can be classified into two groups, like those associated with technical knowledge and socio economic variables.**
- ❖ **The results indicate that region, number of time of fertilizer and pesticide use have contributed significantly to the efficiency of contract crop,**
- ❖ **For non-contract crop the determinants are region, education of farmer and dummy (pesticide use).**

OLS ESTIMATES OF FACTORS INFLUENCING FARM SPECIFIC PRODUCTION EFFICIENCY FOR SAMPLE FARMERS

Variables	Rice Seed (Contract Crop)	Rice (Non-Contract Crop)
Constant	70.84 (6.49)*	81.62 (17.00)*
Age of Farmer	0.07 (0.73)	0.06 (0.95)
Year of Cultivation	1.21 (1.27)	
Region (Village)	3.41 (4.11)*	-1.99 (-2.82)*
Education (Number of Years)	-0.07 (-0.37)	0.57 (3.22)*
Non-Farm Income	0.01 (1.58)	5.48 (1.41)
Times of pesticide Use	-5.50 (-2.15)**	
Times of Fertilizer Use	6.00 (2.02)**	
Dummy (pesticide Use or not)		-4.16 (-2.25)**
R ²	23	0.16
	Prob > F*	Prob > F*

Note: *, ** shows the significant at one and five per cent level respectively

CONCLUSIO N

- There difference in of cost of cultivation across crop
 - Cost of labour constitutes major costs in case of contract crop, whereas, cost of chemical constitute in case of non-contract crop
 - Cost of chemicals per acre use for contract crop was higher than non-contract crop
- Higher correlation between land and output in case of non-contract crop, however, labour and chemical in case of contract crop
- Productivity is higher for contract crop as compared to the non-contract crop.
- Contract farmer are able to achieve higher level of technical efficiency in growing contract crop as compared to non-contract crop

CONCLUSION

- ❖ **Non-farm income, region, number of times pesticide and fertilizer use are the major factors which influence technical efficiency of contract crop.**
- ❖ **Education and pesticide use are the major factors which influence efficiency of non-contract crop**
- The result open up many avenues for future research:
 - The autonomy of farmer in contract farming and spillover effect of technology.
 - The impact of modern technology in contract farming on traditional knowledge of farmer and local environment should be examined in greater depth.

**THANK
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