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An Analytical study of production cost and profitability of paddy – A case of Bhandara District of Maharashtra (India)

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ABSTRACT

This study analyses the production cost and profitability of paddy cultivation in Bhandara district, Maharashtra, India. It categorizes farmers into two groups based on their farm size. The research aims to identify factors affecting production cost and profitability variations between the two groups. The study intends to examine the performance of paddy in Bhandara districts during the period 2023 to 2024. The secondary data on pertaining to area, production and productivity were collected from the various Government published sources i.e. Statistical Abstract of Maharashtra State, District Socio-economic Review, Directorate of Economics and Statistics, Government of Maharashtra. The results of the study indicate, at overall period, the growth rate of area was positively significant at 1 per cent level of significance in Bhandara district. This study can inform policymakers and agricultural extension services on strategies to improve paddy production efficiency and profitability for small and large farmers in Bhandara district.

Introduction

One of the major cereal crops grown worldwide, paddy (Oryza sativa L.) provides the main diet for almost 60% of the global population. Rice has influenced the economies, cuisines, and cultures of several billions of people. Rice is the primary staple food crop of Asia, where 60% of world's population resides. It is the second most widely cultivated crop in the world after maize and is grown in 115 countries spanning a total area of 159.4 million hectare (MHa) with a total production of 696.3 million tonnes (MT) of paddy. However, 88.95% of the global rice area is concentrated in the Asian countries which contribute 90.4% to the global rice production and consumption. India ranks first with the total area under rice cultivation of 42.56 MHa (26.7% of the global area under rice cultivation) but ranks second with the total rice production of 143.96 MT (20.67% of the global production of rice). On the other hand, in China rice is cultivated in 30.1 MHa. (18.8% of the global rice area) with a total production of 197.21 MT (28.3% of the global rice production). This is attributed to low average productivity of 3.38 t/ha in India, as against 6.55 t/ha in China.

Maharashtra's major rice-growing regions include all of the Konkan region's districts, as well as Bhadara, Gondia, Chandrapur, and Gadchiroli. A portion of the Vidarbha district Nagpur. Vidarbha produces 11.92 lakh metric tons of rice annually on an area of 7.36 lakh hectares. According to Anonymous (2013), Bhandara produces 2.49 lakh tonnes of rice on 1.8 lakh hectares of land, with a yield of 1310 kg/hectare. Perhaps as a result of the paddy monoculture, Bhandara district is an agriculturally developed area. The paddy crop has historically been grown in the Bhandara district. It is situated in the Nagpur division. One of the most significant administrative districts in Maharashtra is Bhandara. The prefix "bhana," which means "brass," is the source of the current name of Bhandara because the town is mostly known for its brass- working industry. Because of the more than 3500 little lakes in and around the region, this "Brass City" is also known as the "Region of Lakes." It is a varied economy because of the contributions of industry, agriculture, and forest resources. The Bhandara district is renowned as the "rice bowl of Maharashtra" due to its abundant rice production. Bhandara is divided between the talukas of Pauni and Bhandara. The Tumsar division includes both Tumsar and Mohadi. Sakoli sub-division is composed of three talukas: Sakoli, Lakhani, and Lakhandur. The most commonly spoken language in the district is Marathi, which is also its official language. Bhandara is home to a sizable population of people from all major Indian states as well as from around the globe. Forest resources, manufacturing, and agriculture all contribute to Bhandara's economy. Lakes, parks, sanctuaries, historical places, and old temples are just a few of Bhandara's many tourist attractions.

Review of literature

Sunita N. Suryawanshi, swati A. Gawande, nillima S. Nandeshwar, manjusha gaikwad, B.N. Ganvir5 and S.R. Dalal (2017) The study shows economic analysis of paddy production in Bhandara district for the year 2013-2014 revealed that the per hectare cost of cultivation varied across different farmer categories, with medium farmers incurring the highest total cost. This cost was primarily composed of costs 'A' and 'B', with cost 'A' being a significant portion. Despite variations in costs, all farmer categories yielded gross returns exceeding their respective costs of production. Large farmers garnered the highest gross returns per hectare, followed by medium and small farmers. After deducting cost 'A', net returns per hectare remained positive for all farmer categories, with large farmers having the highest net returns. The per quintal cost of production was highest for small

farmers. Overall, the output-input ratio was favourable, indicating profitability of paddy cultivation in Bhandara district, particularly for larger farmers.

W. A. T. ABEYSEKERA (2014) this paper examines efficiency in paddy farming in Sri Lanka using data from the author's MSc thesis. It aims to: 1) assess productivity coefficients of key resources, 2) identify the gap between current and optimal resource use to gauge economic efficiency, and 3) suggest adjustments to maximize farm profits. Data from 107 rice farms in various districts during Maha 1972/1973 were analysed. Results show farmers generally utilized resources well but faced challenges such as capital constraints and suboptimal fertilizer use. Recommendations include mechanization to address labour shortages and improved farmer education to benefit from new information.

K. KALIRAJAN (1981) this paper aims to enhance traditional production function models by incorporating stochastic elements to explain productivity variations among firms. It explicitly considers both random variability beyond the farmer's control and farmer-specific variability within their control. By applying a Cobb-Douglas production relationship and employing maximum likelihood estimation, the model identifies factors contributing to farmer-specific variability. It finds that farmers' comprehension of technology and access to extension services are significant factors influencing yield variability.

NARVENDRA SINGH CHAUHAN (2006) this study employs data envelopment analysis to assess the energy efficiency of rice farmers in West Bengal, India. It distinguishes between efficient and inefficient farmers, identifies wasteful energy practices, and proposes potential energy savings. By utilizing cross efficiency matrix and virtual input distribution methods, individual farmer performance is evaluated, efficient farmers are ranked, and best practices are identified. Findings indicate that following recommended input packages could save around 11.6% of total input energy. Additionally, enhancing the use of power tillers and introducing improved machinery could enhance energy efficiency and productivity in rice production.

POORNIMA VARMA (2017) this book offers a detailed economic analysis of the System of Rice Intensification (SRI) in India, employing modern econometric techniques. It provides empirical evidence supporting the adoption of SRI methods to enhance rice productivity and ensure sustainable food security. The study evaluates the impact of SRI on household income and yield within a comprehensive framework considering both adoption and its subsequent effects.

MAD NASIR SHAMSUDIN (2016) this study examines the resource-use and allocative efficiency of paddy rice production in MADA, Malaysia, based on data from 396 rice farmers. Various statistical analyses, including Ordinary Least Squares, descriptive statistics, and Gross Margin analysis, were employed. The findings indicate that all inputs used were significantly positive, with rice production proving profitable. However, the study revealed suboptimal allocative efficiency, particularly with fertilizer input showing the least efficiency. The study suggests encouraging farmers to utilize inputs until the marginal product values equate their factor prices to improve overall farm efficiency.

YADAV D.B., HILE R.B (2017) this study examines the adoption and impact of paddy production technology in Maharashtra, based on data collected from 288 paddy cultivators during 2013-14. It evaluates various factors such as benefit-cost ratio, yield gap analysis, adoption index, and impact of technology adoption. Findings reveal a 16.08% yield gap between actual and potential yields, with farmers adopting less than half of recommended technology practices. However, the study highlights that adoption of improved methods can lead to increased yields, with net returns being the most significant contributor to the impact of technology adoption. Overall, the findings emphasize the potential for enhancing paddy yields through the adoption of improved production technologies.

ASHOK K. MITRA (1990) this study focuses on analysing agricultural production in Maharashtra from 1956-57 to 1984-85, recognizing that national estimates of production instability may not accurately represent regional differences, especially in states like Maharashtra prone to low rainfall and water scarcity. It examines growth rates, variability, and instability in food grain production, as well as the impact of irrigation on crop production variability.

RA PATIL, HR SHINDE AND AA DHENDE (2019) this study analyses the technological gaps and constraints in rice cultivation in Maharashtra's Kolhapur district, focusing on traditional, Char-suttri, and Saguna Rice Technology (SRT) methods. SRT cultivators exhibit lower per-hectare cultivation costs compared to traditional methods due to reduced seed rates, irrigation, and labor requirements. Char-suttri method incurs higher costs due to additional operations and inputs. Both SRT and Char-suttri methods show higher benefit-cost ratios than traditional methods, indicating greater profitability. Major constraints faced by farmers include difficult management practices, lack of skilled labour, and limited availability of machinery and tools.

Objectives

1. To study the per unit cost and returns and input-output ratio of paddy.
2. Identifying the most cost-effective farming practices and technologies to optimize production costs and enhance profitability for paddy farmers.
3. Examining the impact of factors such as farm size, input prices, labour availability, and government subsidies on the production cost and profitability of paddy cultivation in Bhandara district.
4. Providing actionable recommendations to farmers, policymakers, and agricultural stakeholders to improve the economic sustainability of paddy farming in the region.

Hypothesis

1. There no significant difference between average profit of large landholder and average profit of small landholder.
2. There no significant difference between cost of large landholder and cost of small landholder.

Data Collection

The current study was limited to the Vidarbha region's Bhandara district. In the Bhandara district, hundred farmers were chosen at random from three tahasils. For the district's 2022–2023 fiscal year, primary data covering practically all of the district's representative areas up to the village level were gathered. The chosen growers provided the primary data on input use, cultivation costs, and returns. With the aid of pretested schedules, additional pertinent data was gathered via

the survey approach. The entire district's worth of data on cultivation costs and yields was assembled using the village-level data that was gathered. The standard cost concept, or costs "A," "B," and "C," was applied to the economics of paddy production.

1) Estimation of per hectare Cost 'A', Cost 'B' and Cost 'C'.

2) Output-input ratio = Gross income / Respective cost

Hypothesis Testing

There no significant difference between average profit of large landholder and average profit of small landholder. Thus, it is hypothesized that Average profit of large landholder *MINUS* average profit of small landholder is EQUAL TO Zero. To test this hypothesis, we applied t test, the obtained result for the same is given below

	Large	**Small**
Mean	203867.5217	149297.087
Variance	6961166541	5892094384
Observations	46	46
Pooled Variance	6426630462	
Hypothesized Mean Difference	0	
df	90	
t Stat	3.264597681	
P(T<=t) one-tail	0.000775481	
t Critical one-tail	1.661961084	
P(T<=t) two-tail	0.001550962	<0.01
t Critical two-tail	1.986674541	

The result confirms that the null hypothesis is not acceptable and there exist a significant difference between profit of large landholders and small landholders.

There no significant difference between cost of large landholder and cost of small landholder. Thus, it is hypothesized that Average cost of cultivating by landholder *MINUS* average cost of cultivating by small landholder is EQUAL TO Zero. To test this hypothesis, we applied t test, the obtained result for the same is given below

	Large	**Small**
Mean	24369	9429
Variance	57605625.2	11963910
Observations	46	46
Pooled Variance	34784767.6	
Hypothesized Mean Difference	0	
df	90	
t Stat	12.1484246	
P(T<=t) one-tail	5.65274E-21	
t Critical one-tail	1.661961084	
P(T<=t) two-tail	0.00000	<0.01
t Critical two-tail	1.986674541	

The result confirms that the null hypothesis is not acceptable and there exist a significant difference between cost of large landholders and small landholders.

Suggestions

1)Optimize Seed Selection: Choose high-quality seeds with better yield potential and resistance to pests and diseases. Participate in seed exchange programs or purchase certified seeds to ensure reliability.

2)Improve Soil Health: Conduct regular soil testing to determine nutrient deficiencies and pH levels. Apply organic amendments like compost and farmyard manure to improve soil fertility and structure, reducing the need for chemical fertilizers.

3)Efficient Water Management: Adopt water-saving techniques such as drip irrigation or alternate wetting and drying (AWD) to optimize water usage. This not only conserves water but also reduces water pumping costs and enhances yield.

4)Mechanization and Labour Management: Invest in appropriate machinery like transplanters and weeders to reduce labour costs and improve efficiency during planting and weed control. Explore options for collective hiring of machinery to share costs among farmers.

5)Crop Diversification and Rotation: Introduce crop diversification by intercropping paddy with compatible crops like pulses or vegetables. Rotation with legumes can improve soil fertility and reduce pest pressure, leading to higher yields and lower input costs.

6)Minimize Post-Harvest Losses: Properly dry and store harvested paddy to minimize losses due to pests, moisture, and mold. Use improved storage structures like hermetic bags or metal silos to preserve quality and reduce post-harvest losses.

7)Utilize Government Schemes and Subsidies: Take advantage of government subsidies on seeds, fertilizers, machinery, and irrigation infrastructure to reduce production costs. Stay informed about available schemes and ensure timely application to avail benefits.

By implementing these suggestions, farmers in Bhandara district can effectively decrease production costs, improve yield and quality, and enhance profitability in paddy cultivation, contributing to the long-term sustainability of their farming enterprises.

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