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An economic study of cost of cultivation and profitability trends in crop cultivation in Jalgaon district

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Abstract
This study focusses at crop cultivation costs and profitability trends among irrigated (Bagayat) and dry land (Jirayat) farmers in Jalgaon district, Maharashtra. With growing worries about agricultural input pricing and economic sustainability, this study investigates whether land type has a substantial impact on farmers' perceived profitability. Primary data was acquired from 110 farmers (56 irrigated, 54 dry land) utilising a standardised questionnaire using a 7-point Likert scale. The study tested a null hypothesis, which suggested that there was no substantial difference in cost or profit between the two groups. Using independent samples t-tests on eleven economic indices, the researchers discovered no statistically significant variations between the two farming divisions. Both irrigated and dry land farmers reported comparable views on rising input costs, market price shifts yield satisfaction, and financial viability. The findings show that, despite differences in water supplies, both groups face similar economic pressures, emphasising a need for targeted government assistance and risk-reduction strategies.

Keywords: Jalgaon agriculture, cost of cultivation, profitability trends, Bagayat vs. Jirayat, irrigated farming, dry land farming, Likert scale, independent samples t-test, agricultural economics, farmer perception.

Introduction
Crop cultivation costs and profitability patterns in India have fluctuated significantly throughout the years, affected by a variety of factors such as input costs, marketplace prices, and government initiatives. The profitability of different crops varies by region and is influenced by input costs, labour, and market conditions. This analysis draws on to provide a comprehensive overview of these trends across various crops and regions.

Review of Literature
This section investigates farming expenses and crop production profitability patterns, using findings from a variety of studies.

Paddy Cultivation
(Chanakya & Nandi, 2024) [3] Growing paddy in India has different profitability among states. Punjab is the most profitable state, thanks to its higher market value and efficient processes, followed by the states of Andhra Pradesh, Uttar Pradesh, and West Bengal in order of decreasing of profit margin.
(Chanakya & Nandi, 2024) [2] The cost of inputs like fertiliser and machine labour has risen, affecting profitability. However, mechanisation in Punjab has decreased labour costs, resulting to improved profitability when compared to places like West Bengal, an area where labour is used more extensively.

Soybean Cultivation
(Sharma, 2016) [7] Soybean production has grown capital intensive, with costs of inputs outpacing returns, resulting in lower profitability in key growing states. Farmers frequently use higher rates of seeds and lower fertilisers, which impacts yield and profitability.
(Sharma, 2016) [7] Profitability has recently improved, but real cost growth continues to surpass profits, necessitating governmental focus on non-price benefits to promote productivity.

Crop Cultivation in Kerala
(Abraham, n.d.) In Kerala, high wages and increasing cultivation expenses have resulted in uneconomic returns on paddy and other yearly crops. However, crops like banana, pepper, and tapioca are still profitable.
(Abraham, n.d.) The rapid growth in land value has considerably impacted the cost of cultivation, rendering certain crops unfeasible when considering total cost criteria.

Pulse Crops in Rajasthan
(Verma *et al*., 2024) [11] The cost for growing pulses such as gramme and urad has risen significantly, resulting in varying profitability trends. While gramme generates more profits per rupee spent, urad's revenues have declined, indicating the need for technological advancements and smarter procurement strategies.

Barley and Maize in Rajasthan
(Verma, 2022) [10] Barley growing has increased profits as well as return every rupee invested, but maize cultivation has decreased net income despite better gross returns. The cost of growing both of the above crops has risen dramatically over the years.

Chilli Cultivation in Telangana
(Natarajan *et al*., 2023) [6] Chilli cultivation in Telangana has a good benefit-cost ratio, and profitability grows with farm size. The average returns per hectare are substantial, indicating a successful venture for larger properties.

Impact of Mgnregs on Foodgrain Profitability
(Narayanamoorthy *et al*., 2018) [5] The introduction of MGNREGS raised labour costs but had no significant influence on foodgrain crop profitability. Increased

productivity has helped businesses maintain or improve profitability despite rising wage costs.

Rainfed vs. Irrigated Crops

(Narayanamoorthy *et al*., 2018) [2] The financial viability of crops grown in rainwater varies, with some crops, such as gramme, profitable in both environments. However, crops like cotton are more profitable according to irrigated conditions, emphasising the impact of irrigation on profitability.

(Mandal, 2021) [4] Madhya Pradesh and Rajasthan had large margins of profit, although input efficiency varied, with labour expenditures being particularly significant and efficiently used.

(Sharma, 2023) [8] The paper examines trends in real revenue from oil seed crops in India, finding that profitability has fallen in states where input costs have increased faster than output or real prices received. Changes in yield, farmer pricing, and input costs all have an impact on revenue. There is a considerable yield gap due to low manufacturing technology adoption and insufficient input application. Addressing these concerns with increased input supply, adoption of technology, and efficient price support will boost farmers' profitability and income.

(Srivastava *et al*., 2017) [9] Despite marginal improvements in physical input utilisation, profitability trends show a substantial change in earnings relative to costs, resulting in different rates of return across crop firms. Moreover, delayed yield advances have hampered profitability, demanding increased farm mechanisation and productivity to offset rising expenses.

(Walnut Cultivation in Kashmir Valley, India: An Economic & Profitability Assessment, 2023) [12] It emphasises the financial viability and financial effectiveness of walnut production, implying room for growth despite specific to a location obstacles experienced by growers.

(Arpitha *et al*., 2024) [1] It discovered that vegetable crops produced considerably greater gross as well as net returns, as well as better water use efficiency. The benefit-cost ratio likewise favoured veggies, indicating higher profitability. While it does not provide a thorough analysis of cost trends in cultivating crops across India, it does illustrate the benefits of growing vegetables in Karnataka under groundwater conditions.

While the economic viability of crop cultivation in India varies widely, several overarching trends can be discovered. Rising input costs, particularly manpower and fertiliser, create significant barriers to profitability. However, areas with better mechanisation and effective technologies, such as Punjab for paddy, are more profitable. Furthermore, government efforts and technological advancements are crucial for enhancing productivity and profitability across a variety of crops and places.

Research Methodology

The study aimed to study of cost of cultivation and profitability trends in crop cultivation in Jalgaon district.

Hypothesis

H_0: In Jalgaon district, there is no significant difference in the cost of cultivation and profitability trends between irrigated land (Bagayat) farmers and dry land (Jirayat) farmers engaged in crop cultivation

H_1: In Jalgaon district, there is a significant difference in the cost of cultivation and profitability trends between irrigated land (Bagayat) farmers and dry land (Jirayat) farmers engaged in crop cultivation

Data collection and research instrument

A study was conducted in the Jalgaon district of Maharashtra, India. Data was gathered from 110 farmers, 56 with irrigated land and 54 with dry land. Respondents judged crop cultivation costs and profitability trends on a 7-point Likert scale, with responses ranging from "Strongly Disagree" to "Strongly Agree."

Data Analysis and Interpretation

In order to achieve the research objective, the methodology involved calculating means and employing an independent samples t-test to assess statistical significance.

Table 1: Independent Samples t-tests

Group Statistics					
Cost of cultivation and profitability trends	**Farmer Type**	**N**	**Mean**	**Std. Deviation**	**Sig. (2-tailed)**
The cost of crop cultivation has increased significantly over the past 3 years.	Irrigated land	64	5.62	1.08	0.183
	Dry land	60	5.46	1.06	
Rising input prices (fertilizers, seeds, labour) are affecting my profitability.	Irrigated land	64	5.68	1.09	0.218
	Dry land	60	5.52	1.17	
I am able to recover my cultivation costs through farming.	Irrigated land	64	5.43	1.22	0.545
	Dry land	60	5.34	1.27	
Farming generates sufficient income for my family's basic needs.	Irrigated land	64	5.22	1.14	0.427
	Dry land	60	5.12	1.13	
Fluctuating market prices impact my profitability heavily.	Irrigated land	64	6.12	0.95	0.698
	Dry land	60	6.07	1.01	
My yield per acre is economically satisfactory.	Irrigated land	64	6.23	0.75	0.897
	Dry land	60	6.24	0.83	
I regularly calculate cost-benefit or profit margins after every crop cycle.	Irrigated land	64	5.55	1.00	0.395
	Dry land	60	5.65	0.98	
Government subsidies/supports have reduced my cultivation expenses.	Irrigated land	64	5.62	1.13	0.691
	Dry land	60	5.67	1.14	
I am confident continuing crop cultivation due to its profitability.	Irrigated land	64	6.08	0.97	0.190
	Dry land	60	5.93	1.04	
If cultivation costs increase further, farming may become economically unviable.	Irrigated land	64	5.92	1.01	0.459
	Dry land	60	6.00	0.86	

Interpretation

1. "The cost of crop cultivation has increased significantly over the past 3 years."

Mean Scores: Irrigated land owner – 5.62; Dry land owner – 5.46, p-value: 0.183, Interpretation: Since the p-value is above 0.05, the difference is not statistically significant. Null hypothesis is not rejected. Both groups perceive a similar increase in cultivation costs over the past 3 years.

2. "Rising input prices (fertilizers, seeds, labour) are affecting my profitability."

Mean Scores: Irrigated land owner – 5.68; Dry land owner – 5.52, p-value: 0.218, Interpretation: p-value above 0.05 indicates no significant difference. Null hypothesis is not rejected. Both irrigated and dry land farmers feel similarly impacted by input cost rises.

3. "I am able to recover my cultivation costs through farming."

Mean Scores: Irrigated land owner – 5.43; Dry land owner – 5.34, p-value: 0.545, Interpretation: Since the p-value is above 0.05, the difference is not statistically significant. Null hypothesis is not rejected. Both farmer groups report similar ability to recover costs.

4. "Farming generates sufficient income for my family's basic needs."

Mean Scores: Irrigated land owner – 5.22; Dry land owner – 5.12, p-value: 0.427, Interpretation: With p-value > 0.05, the difference is not significant. Null hypothesis is not rejected. Both groups share a similar view on income sufficiency from farming.

5. "Fluctuating market prices impact my profitability heavily."

Mean Scores: Irrigated land owner – 6.12; Dry land owner – 6.07, p-value: 0.698, Interpretation: p-value well above 0.05 means no significant difference. Null hypothesis is not rejected. Farmers of both land types are equally affected by market price fluctuations.

6. "My yield per acre is economically satisfactory."

Mean Scores: Irrigated land owner – 6.23; Dry land owner – 6.24, p-value: 0.897, Interpretation: Very similar means and high p-value. Null hypothesis is not rejected. Both groups express similar satisfaction with per-acre yield.

7. "I regularly calculate cost-benefit or profit margins after every crop cycle."

Mean Scores: Irrigated land owner – 5.55; Dry land owner – 5.65, p-value: 0.395, Interpretation: Since the p-value > 0.05, the difference is not statistically significant. Null hypothesis is not rejected. Both farmer types are similarly inclined toward financial tracking.

8. "Government subsidies/supports have reduced my cultivation expenses."

Mean Scores: Irrigated land owner – 5.62; Dry land owner – 5.67, p-value: 0.691, Interpretation: With a high p-value, there is no significant difference. Null hypothesis is not rejected. Both groups report comparable subsidy benefits.

9. "I am confident continuing crop cultivation due to its profitability."

Mean Scores: Irrigated land owner – 6.08; Dry land owner – 5.93, p-value: 0.190, Interpretation: The p-value > 0.05, so the difference is not significant. Null hypothesis is not rejected. Both groups express similar confidence in the profitability of farming.

10. "If cultivation costs increase further, farming may become economically unviable."

Mean Scores: Irrigated land owner – 5.92; Dry land owner – 6.00, p-value: 0.459, Interpretation: Since the p-value is above 0.05, there is no significant difference. Null hypothesis is not rejected. Both groups equally perceive a risk of farming becoming unviable with rising costs.

Conclusion

The study shows that irrigated and dry land farmers in Jalgaon area had similar perceptions of cultivation costs and profitability. Despite disparities in irrigation availability, both groups reported facing similar issues, such as growing input costs, shifting market prices, and concerns about farming's long-term economic viability. Statistical analysis verified that none of the ten tested statements differed significantly across the two farmer categories, hence the null hypothesis was not rejected. These findings demonstrate that economic challenges in agriculture transcend land type and necessitate comprehensive solutions. Policy measures should consequently prioritise both Bagayat and Jirayat farmers, guaranteeing balanced support mechanisms for organic farming in the region.

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