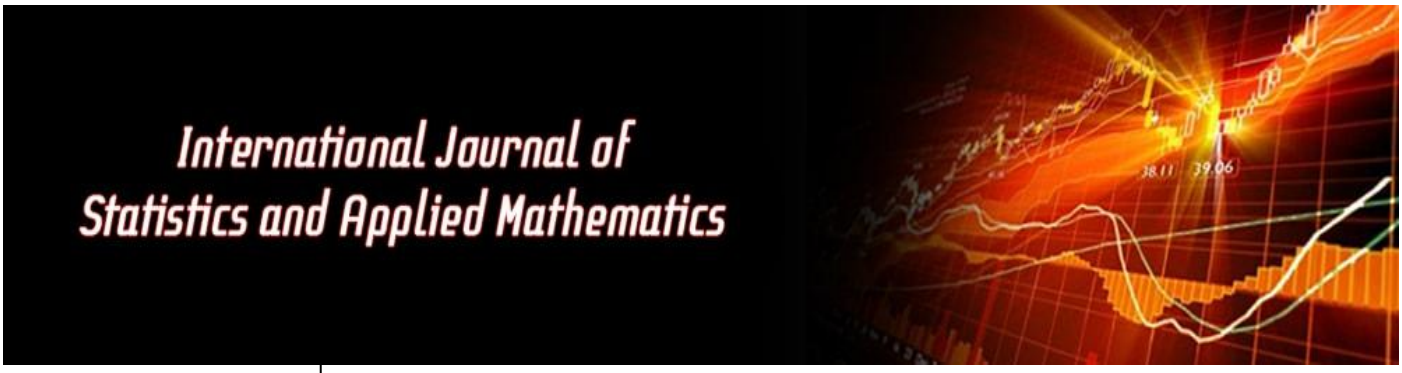

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Economic analysis of production of coriander in Junagadh district of Gujarat

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Abstract
This study was conducted to evaluate the economic aspects of coriander cultivation in Junagadh district of Gujarat, a region known for its significant production of the crop. A sample of 144 coriander growers was selected using a multistage sampling technique, covering diverse farm sizes. Primary data were collected through personal interviews. The analysis revealed that the average total cost of cultivation was ₹61,818.34 per hectare, with the cost increasing across farm categories from marginal to large farms. Among the various cost components, human labour accounted for the largest share, reflecting the crop's labour-intensive nature. The average yield was 17.64 quintals per hectare, resulting in a gross return of ₹117,587.53 and a net return (over Cost-C2) of ₹55,626.84. The input-output ratio, calculated on the basis of Cost-C2, stood at 1:1.90, indicating that every rupee invested yielded ₹1.90 in output.

Keywords: Coriander, cost of cultivation, economic viability, input-output ratio

1. Introduction
Coriander (*Coriandrum sativum* L.) is a significant spice crop cultivated globally, valued for both its seeds and leafy greens. Widely used in culinary traditions, especially in Indian cuisine, coriander serves as a raw material in spice mixes, pickles, bakery items, and traditional medicine. India plays a dominant role in the world market as the top producer, consumer, and exporter of coriander. According to recent estimates, the country contributed approximately two-thirds of global coriander production in 2021 (Anonymous, 2022) [1].
Several Indian states grow coriander, with Rajasthan, Madhya Pradesh, and Gujarat being key contributors. In Gujarat, coriander is grown extensively due to favorable agro-climatic conditions, particularly in the Saurashtra region. During the 2022–23 cropping season, Gujarat recorded around 2.17 lakh hectares under coriander cultivation, producing about 3.13 lakh metric tons (Anonymous, 2023a) [2]. Among the districts, Junagadh ranks at the top in both area and output of coriander (Anonymous, 2023b) [3]. This background makes Junagadh a suitable location for an in-depth economic analysis of coriander cultivation.

1.1 Hypothesis
H_1: The cultivation of coriander is not an economically viable.
H_2: The cost of production per quintal is equal for all the categories of farmers.

2. Materials and Methods
A multistage sampling technique was employed for the present study. Junagadh district was chosen due to its extensive area and significant coriander production. Within the district, three talukas-Mendarda, Visavadar, and Kesod-were also selected purposefully based on their substantial coverage of coriander cultivation. From each taluka, four villages were randomly chosen, resulting in a total of 12 villages for the study. A comprehensive list of coriander-growing farmers in these selected villages was prepared. The farmers were then categorized into four groups based on landholding size: marginal (up to 1.00 ha), small (1.01–2.00 ha), medium (2.01–4.00 ha), and large (above 4.01 ha). In total, 144 coriander farmers from the 12 villages across the three talukas formed the sample for the study. Primary data related to various production aspects were collected through personal interviews with these farmers.

2.1 Cost Concepts

To estimate the economic viability of coriander cultivation, standard cost concepts from farm management studies were applied:

- **Cost-A:** Includes all paid-out costs like labour, seeds, fertilizers, manure, irrigation, and machinery charges.
- **Cost-B:** Cost-A plus the imputed rental value of owned land and interest on fixed capital (excluding land).
- **Cost-C1:** Cost-B plus imputed family labour.
- **Cost-C2:** Cost-C1 plus 10% managerial charges.

Cost of production per quintal was calculated as total Cost-C2 divided by yield. Costs per quintal were also derived for each cost level.

2.2 Returns and Income Measures

- **Gross Return:** Value of main product and by-product.
- **Farm Business Income:** Gross return − Cost-A
- **Family Labour Income:** Gross return − Cost-B
- **Farm Investment Income:** Farm business income − Family labour value
- **Net Income:** Gross return − Cost-C2

3. Result and Discussion

3.1 Cost analysis of coriander production

Coriander cultivation involves a wide range of inputs, and understanding their cost components across different farm sizes is crucial. The analysis revealed that the average cost of cultivation per hectare was ₹61,818.34. This figure was highest on large farms (₹62,445.88) and lowest on marginal farms (₹61,483.14). Among the various cost components, human labour emerged as the largest contributor, accounting for 23.63% of the total cost, due to tasks like sowing, weeding, harvesting, and post-harvest cleaning. Other significant expenses included irrigation (12.02%), insecticides and pesticides (9.13%), and tractor charges (8.39%). Inputs such as seeds, fertilizers, and manure also added to the cost but to a lesser extent. On the fixed cost side, the rental value of owned land (18.51%) was the most significant, followed by managerial charges (9.09%) and interest on fixed capital (1.10%). The findings reflect a direct correlation between farm size and cost due to more intensive resource use on larger farms. These trends are consistent with earlier studies on coriander production in similar agro-climatic zones (Singh *et al*., 2014) [5].

Table 1: Break-up of the total cost of cultivation for coriander (n=144) (Rs/hectare)

Sr. No.	Item	Farm size				
		Marginal	Small	Medium	Large	Overall
1.	Humal labour	14012.00 (22.79)	14458.63 (23.41)	15023.09 (24.28)	15386.66 (24.64)	14610.35 (23.63)
	(a) Family	7045.97 (11.46)	7003.88 (11.34)	7195.98 (11.63)	6781.62 (10.86)	7024.10 (11.36)
	(b) Hired	6966.04 (11.33)	7454.75 (12.07)	7827.10 (12.65)	8605.04 (13.78)	7586.25 (12.27)
2.	Bullock labour	786.98 (1.28)	642.33 (1.04)	668.24 (1.08)	555.76 (0.89)	679.63 (1.10)
3.	Tractor charges	5010.88 (8.15)	5274.53 (8.54)	5154.13 (8.33)	5420.30 (8.68)	5187.19 (8.39)
4.	Seed	2828.22 (4.60)	2674.32 (4.33)	2394.54 (3.87)	2397.92 (3.84)	2609.44 (4.22)
5.	Fertilizer	916.10 (1.49)	1426.72 (2.31)	1355.05 (2.19)	1323.85 (2.12)	1228.82 (1.98)
6.	Manure(trolley)	3590.61 (5.84)	3378.41 (5.47)	3372.15 (5.45)	3215.96 (5.15)	3416.52 (5.53)
7.	Irrigation charge	7789.91 (12.67)	7250.93 (11.74)	7251.67 (11.72)	7268.70 (11.64)	7426.37 (12.02)
8.	Insecticides/pesticides	5564.22 (9.05)	5768.63 (9.34)	5605.81 (9.06)	5638.86 (9.03)	5642.36 (9.13)
9.	Miscellaneous cost	866.91 (1.41)	938.79 (1.52)	1243.67 (2.01)	849.26 (1.36)	972.27 (1.57)
10.	Depreciation cost	1143.59 (1.86)	821.44 (1.33)	940.49 (1.52)	986.64 (1.58)	981.14 (1.59)
11.	Interest on working capital	1506.34 (2.45)	1439.07 (2.33)	1280.80 (2.07)	1261.41 (2.02)	1392.34 (2.25)
12.	Interest on fixed capital	707.06 (1.15)	660.86 (1.07)	692.99 (1.12)	655.68 (1.05)	682.30 (1.10)
13.	Rental value of owned land	11355.94 (18.47)	11475.50 (18.58)	11267.32 (18.21)	11808.52 (18.91)	11445.97 (18.51)
14.	Managerial cost	5588.82 (9.09)	5614.22 (9.09)	5624.38 (9.09)	5676.33 (9.09)	5619.29 (9.09)
15.	Total	61483.14 (100.00)	61762.63 (100.00)	61874.33 (100.00)	62445.88 (100.00)	61818.34 (100.00)

Note: Figures in parentheses indicate percentage to total.

3.2 Estimates of different costs for coriander cultivation

Estimates of different costs, such as Cost-A, Cost-B, Cost-C_1 and Cost- C_2 were calculated and presented in Table 2. It could be inferred from the below table that, overall, per hectare, Cost-A was Rs. 37046.69. It was found to be the highest on large farms (Rs. 37523.73/ha) and the lowest on marginal farms (Rs. 36785.36/ha). Further, the results also showed that Cost-B and Cost-C_1 accounted for about 79.55 and 90.91 percent of Cost-C_2. Overall, Cost-C_2 was Rs. 61818.34 per hectare, which was the highest on large farms

(Rs. 62445.88/ha) and the lowest on marginal farms (Rs.61483.14/ha). An increasing trend was observed in total cost (Cost- C_2) with an increase in farm size from marginal to large. Higher costs on large farms were associated with the intensive use of hired labour, seed and irrigation charges.

Table 2: Estimation of different costs for coriander cultivation (n=144)

Size	Different costs (Rs./hectare)			
	Cost-A	Cost-B	Cost-C_1	Cost-C_2
Marginal	36785.36 (59.83)	48848.35 (79.45)	55894.32 (90.91)	61483.14 (100)
Small	37008.17 (59.92)	49144.52 (79.57)	56148.41 (90.91)	61762.63 (100)
Medium	37093.66 (59.95)	49053.97 (79.28)	56249.55 (90.91)	61874.33 (100)
Large	37523.73 (60.09)	49987.93 (80.05)	56769.55 (90.91)	62445.88 (100)
All farms	37046.69 (59.93)	49174.96 (79.55)	56199.05 (90.91)	61818.34 (100)

Note: Figure in parentheses indicate percentages to Cost-C_2
Source: Field survey.

3.3 Yield, price and returns

The overall average yield of coriander across all farms was 17.64 quintals per hectare, with larger farms achieving the highest yield (18.92 q/ha). The higher output on large farms can be linked to better resource access, timely operations, and improved management practices.

The average selling price was ₹6,665.96 per quintal, varying from ₹6,578.85 for marginal farmers to ₹6,745.33 for large-scale growers. This variation may be attributed to the larger farmers' ability to store produce and sell during favourable market conditions. Accordingly, gross income ranged from ₹110,787.83 to ₹127,621.64 per hectare, with a clear upward trend as farm size increased. These results are in conformity with the findings of Kumar and Kumar (2017) [4]. They also observed that yield per hectare increased with farm size.

Table 3: Yield level, harvest price and gross income per hectare (n=144)

Farm size	Yield (quintal)	Harvest price (Rs./quintal)	Value of gross output (Rs.)
Marginal	16.84	6578.85	110787.83
Small	17.05	6654.56	113460.24
Medium	18.48	6685.09	123540.46
Large	18.92	6745.33	127621.64
All Farms	17.64	6665.96	117587.53

Source: Field survey.

Table 4: Net gains over different costs per hectare (n=144)

Farm size	Net gains over different costs (Rs./hectare)			
	Cost-A	Cost-B	Cost-C_1	Cost-C_2
Marginal	74002.47	61939.48	54893.51	49304.69
Small	76452.08	64315.72	57311.84	51697.62
Medium	86446.8	74486.49	67290.51	61666.13
Large	90097.91	77633.72	70852.09	65175.76
All Farms	80398.50	68270.23	61246.13	55626.84

Source: Field survey.

Table 4 reveals that net returns per hectare over operational cost (Cost-A) were the highest on large farms, amounting to ₹90,097.91, while marginal farms recorded the lowest returns at ₹74,002.47. The average net return across all sample farms stood at approximately ₹80,398.50 per hectare. When considering Cost-B, Cost-C1, and Cost-C2, the overall net returns were ₹68,270.23, ₹61,246.13, and ₹55,626.84 per hectare, respectively. The analysis clearly indicates that net returns per hectare over Cost-C2 ranged from ₹49,304.69 on marginal farms to ₹65,175.76 on large farms. It is evident that net income from coriander cultivation increases with farm size. These findings highlight the significant potential of coriander farming in terms of both income generation and employment opportunities, particularly due to its substantial demand for human labor.

As presented in Table 5, the average per hectare farm business income, family labour income, farm investment income, and intensive income across all farms were ₹80,398.50, ₹68,270.23, ₹73,374.40, and ₹67,755.12, respectively. The net profit per hectare over Cost-C2 was recorded at ₹55,626.84. The analysis indicates a positive trend, where farm business income, family labour income, investment income, intensive income, and net profit all showed an upward movement with an increase in farm size, progressing from marginal to large-scale farms.

3.4 Cost of Production and Input-Output Ratio

The average cost of production (Cost-C2) was ₹3,504.44 per quintal, with marginal farms showing the highest per-quintal cost (₹3,651.02) and large farms the lowest (₹3,300.52), suggesting improved cost efficiency with scale.

The input-output ratio (returns per Rs.1 of investment) on the basis of Cost-C2 was 1:1.90 on all farms. The ratio was lowest on marginal farms (1:1.80) and highest on large farms (1:2.04), again reinforcing the economic advantage of larger farm operations. Notably, when calculated on Cost-A (paid-out cost), the input-output ratio rose to 1:3.17, indicating strong profitability.

Table 6: Cost of production per quintal on the basis of different costs

Farm size	Different costs (Rs./quintal)			
	Cost A	Cost B	Cost C_1	Cost C_2
Marginal	2184.40 (59.83)	2900.73 (79.45)	3319.14 (90.91)	3651.02 (100)
Small	2170.57 (59.92)	2882.38 (79.57)	3293.16 (90.91)	3622.44 (100)
Medium	2007.23 (59.95)	2654.44 (79.28)	3042.83 (90.91)	3348.18 (100)
Large	1983.28 (60.09)	2642.07 (80.05)	3000.50 (90.91)	3300.52 (100)
All farms	2100.15 (59.93)	2787.70 (79.55)	3185.89 (90.91)	3504.44 (100)

Note: Figures in parentheses indicate the percentages to Cost-C_2.

Table 7: Input-output ratio

Farm size	Cost-A	Cost-B	Cost-C_1	Cost-C_2
Marginal	1:3.01	1:2.27	1:1.98	1:1.80
Small	1:3.07	1:2.31	1:2.02	1:1.84
Medium	1:3.33	1:2.52	1:2.20	1:1.99
Large	1:3.40	1:2.55	1:2.25	1:2.04
All Farms	1:3.17	1:2.39	1:2.09	1:1.90

4. Conclusion

Based on the findings, it is evident that coriander cultivation is a profitable enterprise in Junagadh district, especially as farm size increases. The study shows that cost efficiency and profitability improve with scale, with large farmers gaining higher yields, better prices, and greater net income. On average, coriander farmers received ₹3.17 for every Rs.1 invested, highlighting the crop's strong economic viability. Moreover, due to its labour-intensive nature, coriander

farming also offers potential for rural employment generation, particularly in marginal and small farm households. These outcomes suggest that policy support, training in cost-effective practices, and market linkages can further enhance the economic returns from coriander cultivation across all farm categories.

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