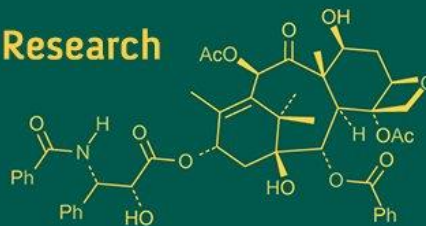
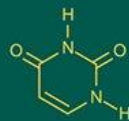


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Cost and return analysis of wheat production in the Sanwer Block of Indore district Madhya Pradesh

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Abstract

The study was conducted to analyze cost of cultivation and profitability of wheat in the Sanwer Block of Indore district, Madhya Pradesh. The respondents were chosen using a multistage sampling process. Five wheat-growing villages were selected, and a total of 75 farmers comprising marginal, small, semi-medium, medium, and large farm categories were interviewed using a pre-tested schedule. The collected data were analyzed using the cost concepts recommended by the CACP to estimate the cost and returns of wheat cultivation. The overall Cost C₃ of wheat cultivation was ₹57004.23 per hectare, while the average yield was 34.85 quintals per hectare. The gross income and net income were ₹92193.33 and ₹35189.10 per ha, respectively. The Benefit-Cost ratio of 1.62 indicated that wheat cultivation in Sanwer block was economically profitable. Large farms recorded higher productivity and profitability than marginal and small farms. The study concludes that wheat cultivation in the Sanwer Block is a profitable.

Keywords: Wheat cultivation, cost analysis, farm profitability, benefit-cost ratio, Sanwer Block

Introduction

Wheat (*Triticum aestivum* L.) is a cereal crop and serves as a staple food for a large proportion of the world's population (Government of India, 2024) [4]. In India, wheat plays a vital role in ensuring food security and contributes significantly to agricultural income and employment (Government of India, 2024) [4]. MP is one of the leading wheat-producing states, where favorable agro-climatic conditions support high productivity (Government of India, 2024) [4]. The profitability of wheat cultivation depends on the efficient use of production inputs, cost management, and adoption of improved cultivation practices (CACP, 2024) [3]. Therefore, an economic analysis of the cost of cultivation and profitability is essential for identifying opportunities to enhance farm income and resource-use efficiency. The study was undertaken to analyze the cost of cultivation and profitability of wheat in Sanwer Block of Indore district, Madhya Pradesh.

Research methodology

The study was conducted in the Sanwer block of Indore district of Madhya Pradesh. The Sanwer Block was selected purposefully because this block has a remarkable place in the cultivation of wheat crop in the Indore district of Malwa plateau. Additionally, to make it easier for the researcher to obtain more precise data. To gather sample farms for the study, multistage random sampling was employed. Depalpur, Indore, Mhow, and Sanwer are the four blocks that make up the Indore district. Sanwer blocks were purposefully chosen during the initial sample step. In the second sampling stage, a list of Sanwer block's wheat-growing villages was created. Five of these villages were then chosen at random, and the wheat-growing farmers from each of those villages were categorized into five main groups based on the amount of land they owned: marginal (less than 1 ha), small (1-2 ha), semi-medium (2-4 ha), medium (4-10 ha) and large (10 ha or above). Next, a sample of seventy-five farmers was chosen.

Cost concepts

The overall cost of producing wheat was estimated using the cost and returns ideas. The estimating process in detail is shown below. (Verma *et al*, 2016 and Kumar *et al*, 2023) [5, 9]

Cost A₁ = All actual expenses incurred in the crop production (Value)

- Value of hired human labour
- Owned bullock labour
- Hired bullock labour
- Owned machine labour
- Hired machine labour
- Seed /seedling (farm produced or purchased)
- Manures and fertilizers
- Plant protection charges
- Irrigation charges
- Land revenue and taxes
- Depreciation on farm building and implements
- Interest on working capital
- **Cost A₂** = Cost A₁ + rent paid for leased in land
- **Cost B₁** = Cost A₁ + interest on value of owned capital asset (Excluding land)
- **Cost B₂** = Cost B₁ + rental value of owned land and rent paid for leased in land
- **Cost C₁** = Cost B₁ + imputed value of family labour
- **Cost C₂** = Cost B₂ + imputed value of family labour
- **Cost C₃** = Cost C₂ + 10% of cost C₂ as managerial cost

$$\text{Cost of production} = \frac{\text{Total Cost} - \text{Value of by Product ₹/ha}}{\text{Main product(ql/ha)}}$$

Income measure

The cost ideas are used to calculate various income measurements. These metrics are displayed below and were utilized in the benefit analysis of this study.

- **Farm business income** = Gross income - Cost A₁
- **Farm investment income** = Farm business income - imputed value of family labour
- **Net income** = Gross income - Total cost (Cost C₃)
- **Family labour income** = Gross income - Cost B₂

$$\text{B: C Ratio} = \frac{\text{Gross income(₹/ ha)}}{\text{Total Cost (₹/ha)}}$$

Result and discussion

Table 1 shows the study's findings regarding the cost of growing wheat in the Sanwer block. According to the table, the average total cost of growing wheat was determined to be ₹57004.23/ha. Large farms had the highest cultivation costs (₹60166.53), followed by medium farms (₹58383.88/ha), semi-medium farms (₹56939.23/ha), tiny farms

(₹55231.95/ha), and (₹54299.57/ha). It showed that the expense of C₃ rose as farm size grew. (Kumar and others, 2025) [6]. Cost A₁ accounts for ₹32931.92/ha, or 57.77% of the total cost of C₃. The large farm had the highest cost A₁ (₹36158.29/ha), followed by medium (₹34405.54/ha), semi-medium (₹32892.44/ha), tiny (₹31152.30/ha), and marginal (₹30051.04/ha). It suggested that Cost A₁ rises as farms get bigger because large farmers spend more on variable inputs. Large farms had the largest cost share of ₹5766.55/ha (10.12 percent of cost C₃) among the cost A₁ component, followed by medium farms (₹5961.43), semi-medium farms (₹5854.77/ha), small farms (₹5467.53/ha), and marginal farms (₹5288.90/ha). It was claimed that because large and medium-sized farms require high-quality seed, the cost of seeds rises as farms get bigger. Small (₹4358.40/ha), semi-medium (₹4780.66 ha), and marginal agriculture (₹4201.26/ha). The cost of hired labor was found to be ₹3710.78/ha (6.51%), with the large farm having the highest price (₹4031.24/ha) and the marginal farm having the lowest (₹3404.20/ha). The overall farm-level irrigation charges were ₹4568.54/ha (8.01%), with marginal, small, semi-medium, medium, and large farm sizes showing ₹4220.75/ha, ₹4390.44/ha, ₹4430.78/ha, ₹4732.74/ha, and ₹5067.98/ha, respectively. The average cost of plant protection chemicals was found to be ₹2576.86/ha, with large farms having the greatest cost (₹5067.98/ha), followed by medium farms (₹4732.74), semi-medium farms (₹4430.78/ha), small farms (₹4390.44/ha), and marginal farms (₹4220.75/ha). At the average farm, the interest on working capital and land revenue state or village Panchayat tax was ₹2043.34/ha (3.58%) and ₹250/ha, respectively. The cost of depreciation for fixing farm equipment and machinery was ₹1448.00 per hectare, and it rose as the farm's size did. The fact that costs A₂ and A₁ are identical suggests that the sampled farmers did not use the land leasing pattern. The costs of B₁, B₂, C₁, and C₂ were determined to be ₹35397.78/ha (62.10%), ₹49197.78 (86.31%), ₹38022.03/ha (66.70%), and ₹51822.03/ha (90.91%). Costs in categories B₁, B₂, C₁, and C₂ rise as farm size increases. The fact that costs A₂ and A₁ are the same for all farm sizes suggests that farmers did not follow the land leasing pattern. The wheat cultivation costs for B₁, B₂, C₁, and C₂ were determined to be ₹30370.5/ha (69.75 percent), ₹37170.57 (85.37 percent), ₹32783.36/ha (75.29 percent), and ₹39583.36/ha (90.91 percent), respectively. After marginal and small farms, the cost of B₁, B₂, C₁, and C₂ increases as farm size increases.

Table 1: Component wise cost of cultivation of wheat in the Sanwer Block (₹/ha)

Particulars	Marginal	Small	Semi Medium	Medium	Large	Overall
Hired human labour charges	3404.2 (6.27)	3570.22 (6.46)	3747.32 (6.58)	3800.89 (6.51)	4031.24 (6.70)	3710.78 (6.51)
Machinery labour charges	4668.09 (8.60)	4970.64 (9.00)	5471.08 (9.61)	5996.96 (10.27)	6197.1 (10.30)	5460.77 (9.58)
Cost of manure	2503.48 (4.61)	2469.14 (4.47)	2249.4 (3.95)	2307.28 (3.95)	2223.04 (3.69)	2350.47 (4.12)
Cost of Fertilizer	4201.26 (7.74)	4358.4 (7.89)	4780.78 (8.40)	4980.66 (8.53)	5461.97 (9.08)	4756.61 (8.34)
Cost of Seeds	5288.9 (9.74)	5467.53 (9.90)	5854.77 (10.28)	5961.43 (10.21)	6260.11 (10.40)	5766.55 (10.12)
Irrigation charges	4220.75 (7.77)	4390.44 (7.95)	4430.78 (7.78)	4732.74 (8.11)	5067.98 (8.42)	4568.54 (8.01)
Cost of plant protection	2489.53 (4.58)	2480.95 (4.49)	2598.08 (4.56)	2607.99 (4.47)	2707.75 (4.50)	2576.86 (4.52)
Interest on working capital	1874.34	1939.51	2039.25	2127.16	2236.44	2043.34

	(3.45)	(3.51)	(3.58)	(3.64)	(3.72)	(3.58)
Depreciation	1150.47 (2.12)	1255.47 (2.27)	1470.98 (2.58)	1640.43 (2.81)	1722.66 (2.86)	1448.00 (2.54)
Land revenue	250.00 (0.46)	250.00 (0.45)	250.00 (0.44)	250.00 (0.43)	250.00 (0.42)	250.00 (0.44)
Cost A ₁	30051.04 (55.34)	31152.30 (56.40)	32892.44 (57.77)	34405.54 (58.93)	36158.29 (60.10)	32931.92 (57.77)
Rent paid for lease in land	0.00	0.00	0.00	0.00	0.00	0.00
Cost A ₂	30051.04 (55.34)	31152.30 (56.40)	32892.44 (57.77)	34405.54 (58.93)	36158.29 (60.10)	32931.92 (57.77)
Interest on fixed capital	2207.75 (4.07)	2307.99 (4.18)	2498.08 (4.39)	2625.95 (4.50)	2689.53 (4.47)	2604.52 (4.57)
Sub Total (Cost B ₁)	32740.57 (60.30)	33778.25 (61.16)	35390.52 (62.15)	36713.53 (62.88)	38366.04 (63.77)	35397.78 (62.10)
Rental value of own Land	13800.00 (25.41)	13800.00 (25.41)	13800.00 (24.24)	13800.00 (23.64)	13800.00 (22.94)	13800.00 (24.21)
Sub Total (Cost B ₂)	46540.57 (85.71)	47578.25 (86.14)	49190.52 (86.36)	50513.53 (86.52)	52166.04 (86.70)	49197.78 (86.31)
Imputed value of family labour	2822.68 (5.20)	2632.61 (5.20)	2572.41 (4.52)	2562.73 (4.39)	2530.80 (4.21)	2624.25 (4.60)
Sub Total (Cost C ₁)	35563.25 (65.49)	36410.86 (65.92)	37962.93 (66.67)	39276.26 (67.27)	40896.84 (67.97)	38022.03 (66.70)
Cost C ₂	49363.25 (90.91)	50210.86 (90.91)	51762.93 (90.91)	53076.26 (90.91)	54696.84 (90.91)	51822.03 (90.91)
Cost C ₃ (C ₂ + 10% of C ₂)	54299.57 (100.00)	55231.95 (100.00)	56939.23 (100.00)	58383.88 (100.00)	60166.53 (100.00)	57004.23 (100.00)

Source: Primary data (2023-2024), Figure in parentheses shows % of cost C₃

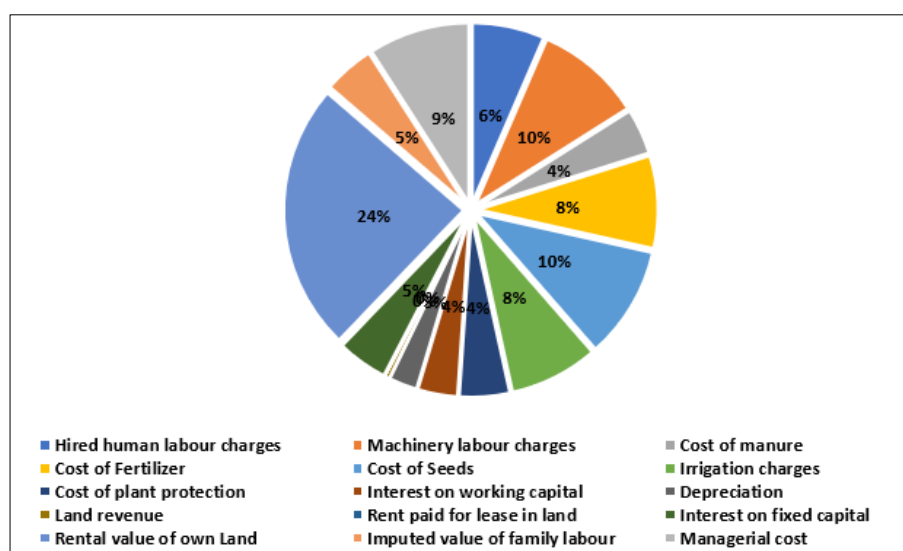


Fig 1: Percentage of different cost items in total cost of wheat cultivation in the Sanwer Block

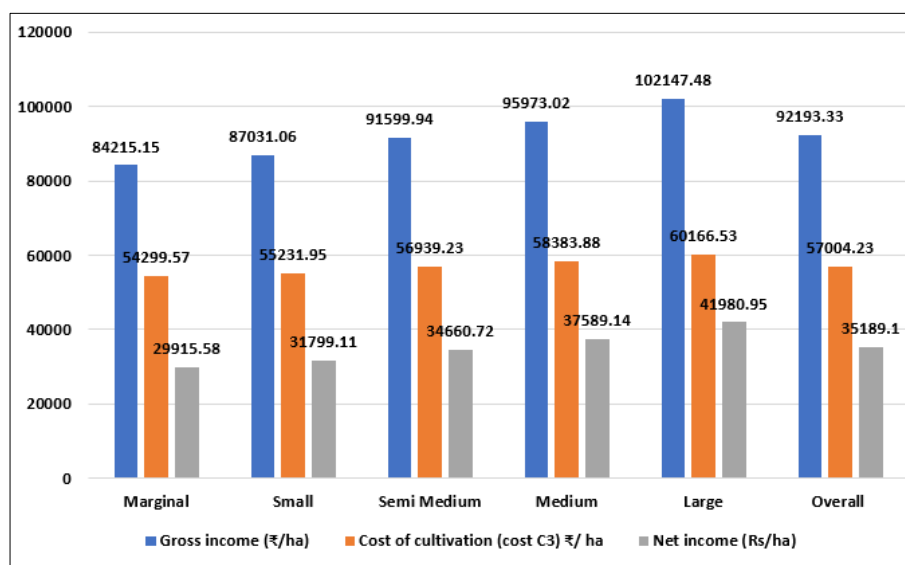
3.2 Profitability of wheat production in the Sanwer block

Table 2 presents the findings of an analysis of the income structure from wheat farming at various farm sizes. The table showed that the average farmer's yield was 34.85 qtl/ha, with large farms having the highest output (37.27 qtl/ha), followed by medium farms (36.05 qtl/ha), semi-medium farms (34.93 qtl/ha), small farms (33.45/ha), and marginal farms (32.55 qtl/ha) (Kumar et al 2025) [6]. In comparison to medium (₹2130.07/qtl), semi-medium (₹2055.08), small (₹1980.48 qtl/ha), and marginal farmers (₹1950.45/qtl), large farmers were found to sell their produce at the greatest rate (₹2230.52/qtl). This shows that large category farmers were paid more per quintal because they had more technical expertise, had marketing resources like storage, etc., and could make their product more useful over time. In contrast to farmers in major categories, small and marginal farmers were paid less per quintal. This is because small and marginal

farms are having trouble selling their produce. The cultivation of wheat yielded the following results: ₹92193.33/ha, ₹57004.23/ha, ₹1063.10/qtl, ₹35189.10/ha, ₹56795.55/ha, ₹40371.30/ha, ₹45437.36/ha, and 1:1.62, respectively. In comparison to medium (₹95973.02/ha), semi-medium (₹91599.94), small (₹87031.06), and marginal (₹84215.15/ha), large farms had the highest gross income (value of main and by-product) from wheat farming (₹102147.48/ha). The statistics also showed that large farms had the highest net income, farm business income, family labor income, and farm investment income. Small farms (₹1029.83/qtl) and marginal farms (₹1031.38/ha) had the lowest production costs, followed by semi-medium farms (₹1062.79/qtl) and medium farms (₹1087.38/qtl). In comparison to medium farms (1:1.64), semi-medium farms (1:1.61), tiny farms (1:1.58), and marginal farms (1:1.55), large farms had the highest benefit-cost ratio (1:1.70).

Table 2: Profitability of wheat in the Sanwer Block at different size of farm

Particulars	Size of farms					
	Marginal	Small	Semi Medium	Medium	Large	Overall
Yield of main Product (qtl/ha)	32.55	33.45	34.93	36.05	37.27	34.85
Price of main Product (₹/qtl)	1950.45	1980.48	2055.08	2130.07	2230.52	2069.32
Value of main Product(₹/ha)	63487.15	66247.06	71783.94	76789.02	83131.48	72287.73
Production of by product (qtl/ha)	25.91	25.98	24.77	23.98	23.77	24.88
Price of by product ₹/qtl	800.00	800.00	800.00	800.00	800.00	800.00
Value of by product ₹/ha	20728.00	20784.00	19816.00	19184.00	19016.00	19905.60
Gross income (₹/ha)	84215.15	87031.06	91599.94	95973.02	102147.48	92193.33
Cost of cultivation (cost C ₃) ₹/ ha	54299.57	55231.95	56939.23	58383.88	60166.53	57004.23
Net income	29915.58	31799.11	34660.72	37589.14	41980.95	35189.10
Cost of production ₹/qtl	1031.38	1029.83	1062.79	1087.38	1104.12	1063.10
Farm business income	51474.58	53252.80	56209.42	59259.50	63781.44	56795.55
Family labour income	34851.90	36820.19	39837.01	42896.77	47450.64	40371.30
Farm investment income	48651.90	50620.19	53637.01	56696.77	61250.64	54171.30
B:C Ratio at cost C ₃	1.55	1.58	1.61	1.64	1.70	1.62

**Fig 2:** Cost of cultivation, gross income and net income under different size of farm In the Sanwer Block (₹/ha)

3.3. Input output ratio over different in the Sanwer Block

The return on an investment of one rupee in the production process is estimated by the input-output (B:C) ratio. The B: C ratio for wheat production over various costs was calculated, and the results are shown in Table 3. The input-output (B: C) ratio data shows that the return on an investment of one rupee in wheat production is more than one rupee. Costs A₁, A₂, B₁, B₂, C₁, C₂, and C₃ were found to have an

average input-output ratio of 1:2.80, 1:2.60, 1:1.87, 1:2.42, 1:1.78, and 1:1.78, respectively.

Large size groups had the highest input-output ratio over total costs (1:1.70), followed by medium (1:1.64), semi-medium (1:1.61), tiny (1:1.58), and marginal (1:1.55), in that order. Wheat production was lucrative both overall and across categories, according to the estimated input-output ratio.

Table 3 B: C ratio of wheat over different cost in the Sanwer Block

Size of farm	Marginal	Small	Semi Medium	Medium	Large	Overall
B:C ratio over cost A ₁ / A ₂	2.80	2.79	2.78	2.79	2.83	2.80
B:C ratio over cost B ₁	2.57	2.58	2.59	2.61	2.66	2.60
B:C ratio over cost B ₂	1.81	1.83	1.86	1.90	1.96	1.87
B:C ratio over cost C ₁	2.37	2.39	2.41	2.44	2.50	2.42
B:C ratio over cost C ₂	1.71	1.73	1.77	1.81	1.87	1.78
B:C ratio over cost C ₃	1.55	1.58	1.61	1.64	1.70	1.62

Source: Field survey (Primary data 2023-24)

Net return over different cost in Sanwer Block

The results are shown in table 4. Net return was computed by subtracting total cost (Cost C₃) from gross return. It was noted from the table that an average net return overcast cost A₁, /A₂, cost B₁, cost B₂, cost C₁, cost C₂, and cost C₃ was recorded ₹,59261.41 ₹ 56795.55, ₹, 42995.55, ₹54171.30,

₹40371.30, ₹35818.64 and ₹35189.10per ha respectively. The net return over cost A₁ found maximum on a large farm (₹ 65989.19/ha), followed by medium (₹61567.49/ha), small (₹ 55878.75ha), semi-medium (₹58707.50/ha), and marginal size of farm (₹ 54164.11/ha. Net return over cost B₁ was found in order of ₹51474.58, ₹53252.80, ₹56209.42,

₹59259.50, and ₹ 63781.44 per hectare on marginal, small semi-medium, small, medium, and large farm size respectively. In case of cost, C₁ net return per hectare was found to be maximum on a large farm (₹61250.64/ha)

followed by medium (₹56696.77/ha), semi-medium (₹53637.01/ha), small (₹ 50620.19), and marginal farm size (₹48651.90). Similar trends also followed in cost C₂ and C₃ in the study area.

Table 4: Net returns over different cost of wheat in the Sanwer Block

Size of farm	Marginal	Small	Semi Medium	Medium	Large	Overall
Net return over cost A ₁ / A ₂	54164.11	55878.75	58707.50	61567.49	65989.19	59261.41
Net return over cost B ₁	51474.58	53252.80	56209.42	59259.50	63781.44	56795.55
Net return over cost B ₂	37674.58	39452.80	42409.42	45459.50	49981.44	42995.55
Net return over cost C ₁	48651.90	50620.19	53637.01	56696.77	61250.64	54171.30
Net return over cost C ₂	34851.90	36820.19	39837.01	42896.77	47450.64	40371.30
Net return over cost C ₃	29915.58	31799.11	34660.72	37589.14	41980.95	35189.10

Source: Field survey (primary data 2023-24)

3. 4. Conclusion: The result depicted that the total cost of cultivation increased with the increase in farm size. Large farms incurred the maximum Cost C₃ (₹60166.53/ha), while marginal farms incurred the lowest (₹54299.57/ha). Expenditure on hired human labour, machinery labour, fertilizers, seeds, and irrigation constituted the major share of the total cultivation cost. Machinery labour and seed costs were relatively higher on medium and large farms, reflecting greater mechanization and the use of quality inputs. The profitability analysis showed that both grain yield and gross income increased with farm size. Large farms recorded the highest grain yield (37.27 q/ha), gross income (₹102147.48/ha), net income (₹41980.95/ha), and Benefit-Cost ratio (1.70), whereas marginal farms recorded the lowest values. The overall Benefit-Cost ratio of 1.62 indicates that wheat cultivation in the Sanwer Block is an economically viable enterprise. The findings suggest that efficient utilization of production inputs, mechanization, and improved management practices contribute significantly to enhancing wheat productivity and farm profitability.

Suggestions

1. Farmers should adopt a balanced and recommended dose of fertilizers based on soil testing to improve nutrient use efficiency and reduce unnecessary expenditure.
2. Timely availability of quality certified seed at affordable prices should be ensured to increase productivity.
3. Custom hiring centres for agricultural machinery should be strengthened to enable marginal and small farmers to access mechanization at reasonable costs.
4. Efficient irrigation methods and scientific water management practices should be promoted to improve water-use efficiency and reduce irrigation costs.
5. Farmers should adopt integrated pest and disease management practices to minimize plant protection costs while maintaining crop health.
6. Government agencies should facilitate easy access to institutional credit at concessional interest rates to reduce dependence on costly informal sources.
7. Regular training and extension programmes should be organized to disseminate improved wheat production technologies and best management practices.
8. Strengthening procurement facilities and ensuring remunerative Minimum Support Prices (MSP) will help farmers obtain better returns from wheat cultivation.
9. Promotion of precision farming, conservation agriculture, and climate-resilient production technologies can further improve productivity while lowering production costs.

10. Small and marginal farmers should be encouraged to participate in Farmer Producer Organizations (FPOs) and cooperative marketing to reduce input costs and improve market access, thereby enhancing overall farm profitability.

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