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Economic analysis for profitable paddy production in Konkan region

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Abstract

Rice cultivation in Maharashtra is primarily concentrated in the Konkan region, which is known for its high rainfall, lateritic soil, and favorable climatic conditions. Other rice-growing regions in Maharashtra include parts of Western Maharashtra, Vidarbha and Marathwada, although productivity in these areas is relatively lower due to water constraints and dependence on monsoons.

This study examines innovative cultivation and processing practices in Palghar, Thane, Ratnagiri, and Sindhudurg districts to address these challenges. In Palghar and Thane, farmers cultivating the Wada-Kolom variety adopted mechanized techniques, including mat-type nursery, rice transplanters, harvesters, and threshers, reducing labor dependency and increasing efficiency. Post-harvest polishing enhanced market value, yielding 60% rice recovery with byproducts retained by millers. In contrast, Ratnagiri farmers relied on traditional, labor-intensive methods without processing, limiting profitability. In Sindhudurg, farmers employed milling, parboiling, and poha-making, achieving rice recovery rates of 63.15%, 67.80%, and 90. respectively. These processes improved nutritional value, storage life, and market appeal, with poha-making yielding the highest returns. Poha production emerges as the most profitable paddy cultivation practice in the Konkan region, yielding a net profit of Rs. 131,884 per hectare, driven by high-value output and strong market demand for flattened rice. Parboiling follows as the second most profitable practice, with a net profit of Rs. 94,271 per hectare, attributed to premium market prices for parboiled rice and moderate cost savings. Mechanization and processing significantly enhance profitability (Rs. 82,019 per hectare) by reducing labor dependency and increasing productivity through substantial cost savings (Rs. 49,863 per hectare).

Keywords: Paddy, profitability, innovative methods, B:C ratio

Introduction

The present study conducted for economic analysis for profitable paddy production in Konkan region of Maharashtra. Study analyzes the comparative economics of innovative paddy cultivation, processing, and marketing practices in Maharashtra's Konkan region, focusing on five adopter groups: general paddy cultivation, mechanization and processing (Wada-Kolom variety), milling, parboiling, and poha making. Data from 75 farmers across Palghar, Thane, Ratnagiri, and Sindhudurg districts reveal significant variations in input utilization, labor allocation, and profitability.

Materials and Methods

Konkan region of Maharashtra state was selected purposively for this study because it is one of the major paddy producing region of Maharashtra. The innovative methods of paddy production were identified in each district and from each district 15 sample for each innovative method has been selected.

The present study was based on primary data. The primary data from farmers were collected by survey method by personal interview with the help of a specially designed

pretested schedule. The data and information for present study was relevant to the agricultural year 2023-24. The selected paddy growing farmers were interviewed and data were recorded during the month of December and January 2025.

For tabular analysis using appropriate statistical tools was employed to data regarding the general information, cost and returns, capital investment, profitability, constraints by the farmers and processing unit owners. For estimation of cost and return of paddy crop the standard cost concept i.e. Cost A₁, A₂, Cost B₁, B₂, and Cost C₁, C₂, C₃ is given by the Commission of Agricultural Cost and Prices (CACP). This study employs a partial budgeting approach to analyze the economic analysis and profitability of paddy cultivation in Konkan region.

Results and Discussion

Comparative economics of various practices adopted by paddy growers

1) Per hectare quantity of input used for different adopter group in paddy cultivation

The mechanization and processing group (N=15) uses 87.01 human labor days (39.4 hired, 47.77 family), 40.76 machine

hours for puddling, transplanting, harvesting, and threshing, 17.06 kg seeds, 20.22 quintals FYM, 275 liters organic slurry, 18 kg nitrogen, 18 kg phosphorus, 10 kg potassium, and plant protection inputs (0.50 kg phorate, 2 liters organic arc, 10 ml sticker), relying minimally on chemical fertilizers. The milling group (N=15) employs 195.66 human labor days (83.23 hired, 110.43 family), 1 bullock labor Day, 9.28 machine hours, 40 kg seeds, 5.87 quintals FYM, 0.24 tons rabbing material, 70.12 kg nitrogen, 19.8 kg phosphorus, 7 kg potassium, and plant protection chemicals (0.35 kg phorate, 250 ml cypermethrin, 10 ml sticker). The parboiling group (N=15) utilizes 192.56 human labor days (80.03 hired, 111.93 family), 1 bullock labor day, 10.50 machine hours, 42 kg seeds, 4.82 quintals FYM, 0.22 quintals rabbing material, 65.18 kg nitrogen, 15.06 kg

phosphorus, 12.04 kg potassium, and plant protection inputs (0.35 kg phorate, 250 ml cypermethrin, 10 ml sticker). The poha maker group (N=15) uses 191.59 human labor days (67.25 hired, 124.34 family), 0.45 bullock labor days, 8.89 machine hours, 35 kg seeds, 4.82 quintals FYM, 0.28 quintals rabbing material, 60.13 kg nitrogen, 20.19 kg phosphorus, 15.21 kg potassium, and plant protection chemicals (0.35 kg phorate, 250 ml cypermethrin, 10 ml sticker). Across all groups, family labor exceeds hired labor, with the mechanization and processing group using the least labor and highest organic fertilizer, aligning with Kamble (2015) ^[2] on technology adoption in rice cultivation in Raigad District, Maharashtra. These patterns underscore diverse resource allocation strategies, offering insights for optimizing agricultural efficiency.

Table 1: Per hectare quantity of input used for different adopter group in paddy cultivation

Sr. no.	Particulars	General paddy cultivation (N=15)	Mechanization & processing (N=15)	Milling (N=15)	Parboiling (N=15)	Poha maker (N=15)
1	Hired human labor(Days)					
	Male	30.90	19.36	41.78	38.88	38.35
	Female	38.10	19.88	55.61	61.45	63.64
2	Bullock labor (Days)	1.13	-	1.00	1.00	1.52
3	Machine Hrs.	9.24	40.76	9.28	10.50	8.89
4	Seed (Kg)	45.00	17.06	40.00	42.00	35.00
5	FYM (qt.)	4.25	20.45	5.87	4.82	4.26
6	Rab material (qt.)	0.25	-	0.24	0.22	0.28
	Organic slurry (Lit.)	-	275	-	-	-
7	Fertilizer (Kg)					
	N	52.12	18.00	70.12	65.18	60.13
	P	20.47	18.00	19.81	15.06	20.19
	K	15.24	10.00	7.32	12.04	15.21
8	Plant protection					
	Prorate (Kg)	0.50	0.50	0.35	0.35	0.00
	cypermethrin	220.00	-	250.00	250.00	250.00
	karate (ML.)	50.00	-	-	-	50.00
	organic arc (Lit.)	-	2.00	-	-	-
	Sticker (ML.)	10.00	10.00	10.00	10.00	10.00
9	Family labor (Days)					
	Male	60.59	29.65	55.89	61.83	63.42
	Female	68.97	18.12	68.74	70.57	82.12

2) Per hectare labor utilization in case of general group of paddy cultivation

Tables 2. present per hectare operation-wise labor utilization across five paddy grower groups in the Konkan region. The general paddy cultivation group (N=15) utilizes 198.56 human days, 1.13 bullock pair days, and 9.24 machine hours. The mechanization and processing group (N=15) employs 97.55 human days and 40.76 machine hours, with no bullock labor. The milling group (N=15) uses 213.51 human days, 0.70 bullock pair days, and 9.28 machine

hours. The parboiling group (N=15) requires 221.43 human days, 1.00 bullock pair day, and 10.50 machine hours. The poha maker group (N=15) utilizes 227.47 human days, 1.52 bullock pair days, and 8.89 machine hours. Puddling and transplanting are the most labor-intensive operations (20.67-30.57%), with the mechanization and processing group using the least human labor (97.55 days) due to high mechanization (40.76 hours). The poha maker group requires the most human labor (227.47 days)

Table 2: Per hectare labor utilization in different adopter groups of paddy cultivation

Sr. no.	Particular	Family labors		Hired labor		Total human (Days)	Total Bullock Pairs (Days)	Total Machine (Hrs.)
		Male (Days)	Female (Days)	Male (Days)	Female (Days)			
1	General paddy cultivation	60.59 (30.52)	68.97 (34.74)	30.90 (15.56)	38.10 (19.19)	198.56 (100)	1.13 (100)	9.24 (100)
2.	Mechanization and processing	34.51 (35.37)	20.92 (21.45)	20.98 (21.51)	21.14 (21.67)	97.55 (100)	-	40.76 (100)
3.	Milling group	55.89 (26.18)	68.74 (32.20)	39.4 (18.45)	55.33 (25.91)	213.51 (100)	0.70 (100)	9.28 (100)
4.	Parboiling	61.83 (27.92)	70.57 (31.87)	37.15 (16.78)	51.88 (23.43)	221.43 (100)	1.00 (100)	10.50 (100)
5.	Poha maker	63.42 (27.88)	82.16 (36.12)	35.67 (15.68)	46.22 (20.32)	227.47 (100)	1.52 (100)	8.89 (100)

(Figures in parentheses indicate percentage to total)

3) Profitability of Paddy Cultivation at Different Groups of Innovative Production, Processing, and Marketing Practices

Table 3. evaluates the profitability of paddy cultivation across five practices: traditional cultivation, mechanization and polishing, milling, parboiling, and poha production (N=15 for each). Key findings indicate that poha production yields the highest gross return (Rs. 252,600/ha) and net profit at Cost A1 (Rs. 206,652/ha), driven by high-value output (32 quintals at Rs. 240,000). Parboiling follows with a gross return of Rs. 205,816/ha and profit at Cost A1 of Rs.

151,728/ha, while mechanization and polishing generate Rs. 159,384/ha in gross return and Rs. 99,421/ha in profit. Milling yields Rs. 173,022/ha in gross return, and traditional cultivation is the least profitable with Rs. 86,317/ha in gross return and Rs. 39,339/ha in profit. Costs (C3+21+22+23) are highest for poha (Rs. 158,706/ha) and milling (Rs. 158,292/ha), while mechanization has the lowest total cost (Rs. 116,566/ha). Input-output ratios are highest for poha (5.37 at Cost A1) and lowest for traditional cultivation (0.70 at total cost), highlighting the superior economic efficiency of value-added processing.

Table 3: Profitability of paddy Cultivation at different group of innovative production, processing and marketing practices

Sr.no.	particular	Traditional paddy cultivation (N=15)		Mechanization and polishing (N=15)		Milling (N=15)		Parboiling (N=15)		Poha (N=15)	
A)	Main Yield	Qty.	Cost	Qty.	Cost	Qty.	Cost	Qty.	Cost	Qty.	Cost
a.	Paddy	32.45	74635	35.2	85008	38	87780	35.4	82128	35	81025
b.	Milled Rice	-	-	-	-	24	158607	-	-	-	-
c.	Polished rice	-	-	21.12	146784	-	-	-	-	-	-
d.	Parboiled Rice	-	-	-	-	-	-	26.55	192222	-	-
e.	Poha	-	-	-	-	-	-	-	-	32	240000
B)	By-produce (Q)	-	-	-	-	-	-	-	-	-	-
	Straw	38.94	11682	42	12600	45	14415	42	13594	42	12600
22	Gross return (Rs.)		86317		159384		173022		205816		252600
C)	cost of cultivation at										
	A1		46978		59963		54178		53129		45948
	B1		47853		47853		55743		54088		47072
	B2		62139		78997		72553		69800		62576
	C1		97743		81819		98166		97460		94920
	C2		112029		112029		114976		113172		110424
	C3		123232		107734		126473		124489		121466
D)	Total cost (C3+21+22+23)		124253		116566		158292		149206		158706
E)	profit at										
	A1		39339		99421		118844		151728		206652
	B1		38464		111531		117279		151728		205528
	B2		62139		78997		72553		69800		62576
	C1		-11426		77565		74856		108356		157680
	C2		-25712		47355		58046		92644		142176
	C3		-36915		51650		46549		81327		121466
	Total cost C3+21+22+23		123232		107734		14730		56610		93894
F)	input output ratio at										
	Cost A1		1.80		3.33		3.10		3.81		5.37
	Cost B1		1.39		2.02		2.38		2.95		4.04
	Cost B2		0.88		1.95		1.76		2.11		2.66
	Cost C1		0.77		1.42		1.50		1.82		2.29
	Cost C2		0.77		1.42		1.50		1.82		2.29
	Cost C3		0.70		1.48		1.37		1.65		2.08
	Total cost C3+21+22+23		0.70		1.37		1.09		1.38		1.59

4) Economic impact of various adopter groups over general paddy cultivation(a) Economic impact of mechanization and processing over general paddy cultivation

The economic analysis of adopting mechanization and processing techniques in paddy cultivation, as presented in Table 4(a), reveals a substantial increase in net profit by Rs. 82,019 per hectare compared to traditional paddy cultivation methods. This significant profit gain is primarily driven by enhanced revenue from improved main yields and by-

products, contributing Rs. 73,067 per hectare, with machinery adoption markedly boosting productivity. However, mechanization incurs additional costs totaling Rs. 40,911 per hectare. These costs are partially offset by substantial savings amounting to Rs. 49,863 per hectare. The findings highlight mechanization as a highly profitable strategy, particularly suited for large-scale or progressive farmers with access to machinery, as it reduces labour dependency while maximizing output through significant cost savings and revenue growth.

Table 4 (a): Economic impact of mechanization and processing over general paddy cultivation

Debit Side	Amount (Rs.)	Credit Side	Amount (Rs.)
A: Added Costs per ha.		C: Reduced Costs per ha.	
processing labour charges	6,675	Labor (Male)	20,829
Machine charges	13,347	Female	24,174
electricity	1,598	Seed	1,764
Organic slurry (Lit.)	4,455	Chemical Fertilizer (NPK)	1,096
Organic Fertilizer (FYM)	6771	Bullock Pairs	1,000
Incidental Charges	1136	Rabb Material	1,000
Interest on Working Capital	638		
Depreciation	1,714		
Interest on Fixed Capital	2,039		
Rental Value of Land	1,835		
Subtotal A	40,911	Subtotal C	49,863
B: Reduced Returns per hectare		D: Added Returns per hectare	
None	-	Gross Return (Main Yield + By- product)	73,067
Subtotal B	-	Subtotal D	
Total Debit (A + B)	40,911	Total Credit (C + D)	122,930

(Figures in Rs.)

Economic impact of mechanization & processing over general is Rs. 82,019 per hectares.

(b) Economic impact of milling over general paddy cultivation

It was revealed from Table 4 (b) switching from general paddy cultivation to milling increases net profit by Rs. 58,484 per hectare, primarily due to higher returns from processed rice Rs. 86,705, driven by improved grain quality

and marketability. Added cost resulted total was Rs. 40,116 per hectare. In milling group of paddy cultivation saved Rs. 3,584. and in return from processing increased to Rs. 86705 therefore total amount in credit side was Rs. 90,289 while to debit side total amount was Rs. 40,116 hence resulting net profit for milling group was Rs. 50,173.

Table 4 (b): Economic impact of milling over general paddy cultivation

Debit Side	Amount (Rs.)	Credit Side	Amount (Rs.)
A: Added Costs per ha		C: Reduced Costs per ha.	
Female	227	Labor (Male)	2,869
processing labour charges	11364	Seed	325
Chemical Fertilizer (NPK)	3,393	Bullock Pairs	265
Organic Fertilizer (FYM)	1,133	Rabb Material	125
Incidental Charges	3479	Machine Hours	896
Interest on Working Capital	405		
Depreciation	50		
Interest on Fixed Capital	690		
Rental Value of Land	2,524		
processing charges	15,955		
Subtotal A	40,116	Subtotal C	3,584
B: Reduced Returns per ha		D: Added Returns per ha.	
None		Gross Return (Main Yield + By-product)	86705
Subtotal B	-	Subtotal D	86705
Total Debit (A + B)	40,116	Total Credit (C + D)	90,289

(Figures in Rs.) Economic impact of milling over general is 50,173 Rs per hectares

c) Economic impact of parboiling over general paddy cultivation

From table 4 (c) it was observed that switched to general paddy cultivation to parboiling increased net profit by Rs. 94271 per hectare, primarily due to higher returns from parboiled rice (Rs. 119,499), and premium market prices. Additional cost required for parboiling was Rs. 28,209 per

hectare. Cost saved were minimal, total Rs. 2,980. Hence total credit was resulted from gross return and other cost saving Rs.122,479. The net profit was Rs.94271 for parboiling group of adopters over the general paddy cultivation group. The economic impact underscores parboiling as ideal for farmers with access to processing facilities and premium markets.

Table 4 (c): Economic impact of parboiling over general paddy cultivation

Debit Side	Amount (Rs.)	Credit Side	Amount (Rs.)
A: Added Costs per ha.		C: Reduced Costs per ha	
Bullock Pairs	608	Male labour	1088
Incidental Charges	4229	Female labour	1204
Organic Fertilizer (FYM)	608	Machine Hours	42
Interest on working capital	351	Seed	325
Electricity	1520	Chemical Fertilizer (NPK)	17
Rental Value of Land	1426	Rabb Material	175
Labour charges for processing	7,077	Depreciation	45
Processing charges	12390	Interest on Fixed Capital	84
Subtotal A	28,209	Subtotal C	2,980
B: Reduced Returns per hectare		D: Added Returns per hectare	
None	-	Gross Return (Main Yield + By-product)	119,499
Subtotal B	-	Subtotal D	122,479
Total Debit (A + B)	28,208	Total Credit (C + D)	122,479
(Figures in Rs.) Economic impact of parboiling over general is 94271 Rs per ha.			

d) Economic impact of poha maker over general paddy cultivation

Table 5 (d) showed that by Switching from general paddy cultivation to poha making increased net profit was Rs.127,388 per hectare, primarily due to exceptionally high returns from flattened rice was Rs. 166,283, driven by its premium market value and strong consumer demand. Poha production significantly enhances revenue through value

addition. Added cost resulted in total debit of Rs. 39,487 per hectare. Whereas cost saved was included 1,876. Gross return was increased due to processing of Rs. 166,283 resulted credit side was Rs.171,371. The net profit received by poha maker adopter group was Rs.131,884. Economic impact for poha maker group was maximum (Rs.131,884) followed by parboiling (94271), mechanization and processing (Rs.82,019) and milling (Rs.50,173).

Table 4(d): Economic Impact of poha maker adopter group over general Paddy Cultivation

Debit Side	Amount (Rs.)	Credit Side	Amount (Rs.)
A: Added Costs per ha.		C: Reduced Costs per ha.	
processing labour charges	14,920	labour charges male	1658
Organic Fertilizer (FYM)	328	labour charges female	1508
Chemical Fertilizer (NPK)	233	Bullock Pairs	527
Electricity	1240	Machine Hours	1,169
Incidental Charges	5479	Seed	125
Interest on fixed capital	249	Rabb Material	55
Rental value of land	1218		
Processing charges	15820	Interest on Working Capital	46
Subtotal A	39,487	Subtotal C	5,088
B: Reduced Returns per ha		D: Added Returns per ha	
None	-	Gross Return (Main Yield + By-product)	166,283
Subtotal B	-	Subtotal D	166,283
Total Debit (A + B)	39,487	Total Credit (C + D)	171,371
(Figures in Rs.) Economic Impact of poha making group over general Paddy Cultivation group 131,884 Rs per hectare			

Conclusion

1. In the study area observed land utilization patterns reveal diverse strategies, with the poha group having the highest irrigated land (22.05%) and current fallow (17.08%), while milling relies heavily on unirrigated land (86.26%).
2. Cropping intensity is highest in general paddy cultivation (129.70%) and lowest in poha production (107.03%), indicating that innovative practices prioritize value addition over.
3. Poha production emerges as the most profitable paddy cultivation practice in the Konkan region, yielding a net profit of Rs. 131,884 per hectare.

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