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An Economic Analysis of Inter-Crop Profitability during the Post-Reform Period in Kerala

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Abstract: Economic reforms have brought about a rising trend in the costs of inputs and a steep decline in the prices of agricultural commodities, making agriculture a losing proposition in the state. The situation's urgency is evident in the fact that agricultural wages are among the country's highest, while the sale proceeds' remuneration needs to be commensurate. There is a steady decline in the area available for the cultivation of paddy and tapioca. Cash crops like rubber and coconut have started to show a decline in the area under cultivation. In this context, this study aims to analyse inter-crop profitability in the post-reform period to understand if there has been a decline in crop cultivation profitability. It also focuses on the profitable crops, the extent to which they are profitable, and the reasons for the decline in profitability among the crops in Kerala. The study is based on the cost of cultivation data for different crops published by the Department of Economics and Statistics, Government of Kerala.

Keywords: Cost of Cultivation, hired human labour cost, gross Value of output per hectare, net Value of output per hectare, relative crop profitability, profit from crop cultivation, interest on land value

The agricultural sector in Kerala has been under severe pressure as the prices of major crops have experienced wild fluctuations with sharp falls in successive years. The decline in farm prices has made agriculture an unprofitable venture. The rise in the cost of cultivation, the fall in agricultural prices, the decline in productivity and the high wage rate are cited as reasons for the decline in agricultural profitability. The area under cultivation of paddy, tapioca and other annual crops has shown a consistently declining trend. Even the area under cultivation of perennial commercial crops like rubber and coconut has also started to decline.

Given the challenging agricultural landscape in Kerala, understanding the relative profitability of crops is crucial. Our study seeks to answer

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practical questions that can guide agricultural decisions. By providing insights into the inputs contributing to the rise in the cost of cultivation, the net return from agricultural crop production, and the relative profitability of different crops, we engage our readers and show them the real-world implications of our research. Farmers, being rational, will be attracted to more profitable crops and avoid cultivating those that are not financially viable. Our research provides valuable insights that can inform such decisions.

Methodology

This study is based on the Cost of Cultivation data of different crops published by the Department of Economics and Statistics, Government of Kerala, in the Report on the Cost of Cultivation of Important Crops in Kerala for various years. The crops included in the study are autumn, winter, summer, coconut, banana, pepper, tapioca, ginger and turmeric. The methodology used for the computation of the cost of Cultivation categorises the cost of cultivation into Cost A, Cost B, and Cost C. Cost A is the total paid-out cost (both cash and kind expenses) of the farmers, which includes the expenditure on hired labour and inputs used in the cultivation of the crop. Cost B is defined as cost A plus interest on fixed capital, including land. The crop's profitability is determined by deducting the cost of Cultivation per hectare from the gross output value per hectare. The period considered for the study extends from 2000-01 to 2020-21, corresponding to the post-reform period. For our analysis, we consider five-time points during the period under study. We use simple percentage analysis to show the changes in the variables between 2000-01 and 2020-21.

Discussion

Rise in Agricultural wages and hired labour cost

Kerala is a state where the wages of agricultural labour are among the country's highest. The wage rate of male unskilled agricultural workers was Rs. 123.15 in 2000-01, which increased to Rs.741.89 in 2020-21, recording an increase of 502.43% over the period. In the wages of female unskilled agricultural workers, the wage rate increased from Rs.82.38 in 2000-01 to Rs.536.68 in 2020-21, marking an increase of 551.47%. Field crops like paddy are highly female labour intensive, making it very difficult to sustain the Cultivation of the crop due to the high wage rate.

The hired labour cost component of coconut increased from Rs.7328 in 2000-01 to Rs.56511 in 2020-21, with an increase of 671%. The hired labour cost of pepper increased from Rs.8185 in 2000-01 to Rs 56068 in 2020-21, recording an increase of 585% during the period under consideration. The percentage increase in hired human labour cost of paddy Autumn, paddy winter and paddy summer was only 181.76%, 256.69% and 193.05%,

which is not consistent with an increase in the wage rate of agricultural labourers. This shows that the farmer has resorted to a coping strategy of substituting the agricultural hired labourer with increased use of capital in the post-reform period. The hired human labour expenditure was the highest for Banana cultivation in 2020-21 at Rs.92500 per hectare. The other crops with high hired human labour costs were tapioca, ginger and turmeric, which are annual crops with high labour intensity.

Table 1: Average daily wage rate (Rs.)of unskilled workers (paddy field workers) in the agricultural sector

Year	Male	female
2000-01	123.15	82.38
2005-06	166.39	108.19
2010-11	312.82	228.48
2015-16	586.06	422.19
2020-21	741.89	536.68
Percentage change	502.43%	551.47%

Source: Economic Review, various issues

The total hired human labour cost per hectare was the highest in banana and ginger cultivation from 2000 to 01. In 2020-21, banana, tapioca and ginger remained the crops with the highest total hired human labour cost per hectare. Pepper and coconut crops recorded the highest percentage increase in total hired human labour cost post-reform period. The total hired human labour cost of coconut increased by 671%, and that of pepper increased by 585%. The hired human labour cost increased by 181%, 256% and 193% for Paddy autumn, Paddy winter and Paddy summer. Ginger is another crop for which the cost of hired human labour increased by 303%. The increase in the total hired human labour cost could be due to two reasons. First is the increase in the wage rate of agricultural workers, and second is the increased usage of labour. The data on agricultural wages of male and female workers show that the wages increased tremendously during the period under consideration. The wage cost as a percentage of operational cost has shown a consistently declining trend in the case of annual crops like paddy, tapioca, ginger and turmeric. In Paddy Autumn, the wage cost comprised 61.42 per cent of operational cost in 2000-01, which was only 42.95% in 2020-21. Paddy winter and paddy summer also witnessed a similar decline in wage cost as a percentage of operational cost. Whereas in the case of crops like coconut and pepper, which have a longer lifespan, the share of wage cost showed an increasing trend. The labour cost as a percentage of the operational cost was 61% and 60% for

pepper and coconut, respectively, in 2020-21. Table 2 shows the total cost of hiring human labour to cultivate crops.

Table:2 Total hired human labour (Rs/hectare)

Crops	2000-01	2005-06	2010-11	2015-16	2020-21	Percentage change
Paddy (A)	10571	9782	16833	25041	29785	181.76
Paddy (W)	8615	9967	20202	24656	30729	256.69
Paddy (S)	10686	9851	17211	24470	31316	193.05
Coconut	7328	11069	19750	37028	56511	671.16
Banana	26683	31403	31977	74767	92500	246.66
Pepper	8185	10787	22465	34186	56068	585.00
Tapioca	15672	13476	31293	46627	72426	362.13
Ginger	17260	20553	38333	64038	69702	303.83
Turmeric	14483	17116	27333	32455	62607	332.28

Source: Report on Cost of Cultivation of Important Crops in Kerala, Dept. of Economics and Statistics, Govt. of Kerala, Various issues.

Table 3 shows the wage cost as a percentage of the operational cost, showing that the expenditure on wage cost as a percentage of operational cost has declined consistently over the period. This could be because the farmer has resorted to coping strategies like reducing the number of labourers and increasing the mechanisation in cropping activities. On the other hand, for crops like coconut and pepper, the scope for mechanisation has been lesser, and there has been an increase in the percentage of hired human labour costs. There has been a consistent decline in the wage cost as a percentage of operational cost in the case of paddy. In the case of coconut and pepper, the percentage of wage cost has shown an increasing trend. Regarding crops like ginger, banana and turmeric, the percentage of expenses on wage cost has been steady.

Table 3: Wage cost as a percentage of Operational cost

Crops	2000-01	2005-06	2010-11	2015-16	2020-21
Paddy (A)	61.42	51.56	52	48.32	42.95
Paddy (W)	52.79	52.20	49	44.79	37.67
Paddy (S)	52.72	49.12	45	41.79	40.00
Coconut	56.67	53.85	59	60.28	60.94
Banana	29.04	41.28	38	42.39	39.41
Pepper	58.73	54.28	59	57.87	61.54
Tapioca	62.43	53.61	64	54.61	51.32

Ginger	31.92	33.24	34	32.62	34.98
Turmeric	44.81	44.16	46	44.08	44.20

Source: Report on Cost of Cultivation of Important Crops in Kerala, Dept. of Economics and Statistics, Govt. of Kerala, Various issues.

Table 4: Estimates of Cost A and Cost B per hectare. In each case, the first Value corresponds to cost A, and the Value in parenthesis corresponds to cost B (Rupees)

Crops	2000-01	2005-06	2010-11	2015-16	2020-21	2000-01 to 2020-21 percentage change (cost A)
Autumn paddy	17210 (36568)	18971 (40319)	32019 (91877)	51823 (95647)	69344 (486167)	302.92
Winter Paddy	16318 (31154)	19094 (44933)	41133 (122697)	55044 (94977)	81572 (237973)	399.89
Summer Paddy	20270 (30400)	20057 (38598)	37957 (86712)	58555 (102857)	78285 (312164)	286.21
Coconut	12955 (165318)	20555 (204220)	33343 (538739)	61429 (386208)	92727 (646755)	615.76
Banana	91853 (149356)	76080 (216930)	104903 (443736)	176400 (354317)	234710 (675409)	155.52
Pepper	13938 (185638)	19874 (276448)	38052 (429123)	59074 (224842)	91110 (668001)	553.68
Tapioca	25102 (128055)	25136 (166303)	48474 (434258)	85382 (296023)	141117 (555073)	462.17
Ginger	54082 (134790)	61835 (176939)	112123 (430826)	196316 (330415)	199246 (586229)	268.41
Turmeric	32320 (115232)	38762 (284611)	59707 (462861)	73625 (198309)	141668 (614223)	338.33

Source: Report on Cost of Cultivation of Important Crops in Kerala, Dept. of Economics and Statistics, Govt. of Kerala, Various issues.

Rise in Cost of Cultivation

Table 4 shows the estimates of cost A, and the figures in parenthesis are cost B per hectare for the crops under consideration for five intermittent years during the post-reform period. Both the cost A and B estimates consistently increase during the period. The highest cost A was witnessed in the coconut crop, with an increase in the cost of Cultivation from Rs 12955 in 2000-01 to Rs 92727 in 2020-21, with an increase of 615%. This

increase in the cost of coconut cultivation is very much consistent with the increase in the wage rate of agricultural labourers. Pepper is another crop which witnessed an increase in cost A from Rs.13938 in 2000-01 to Rs.91110 in 2020-21, recording a rise of 553%. The increase in the cost A of Banana cultivation was the lowest, with an increase of 155% during the period. The increase in the cost A of cultivating paddy Autumn, paddy winter and paddy summer was 302%, 399% and 286%, respectively. Cost A of ginger cultivation increased by 268%, and tapioca increased by 462%. The cost of Cultivation per hectare was the highest for bananas, with Rs.234710, followed by ginger cultivation, with Rs.199246 in 2020-21. For all the time points, ginger and banana had the highest cost of Cultivation per hectare. The rapid rise in the cost of cultivation calls for government intervention in the market, either in the minimum support price or in the form of assured inputs at subsidised prices.

Table 5 shows the Value of output per hectare(Rupees per hectare)

Crops	2000-01	2005-06	2010-11	2015-16	2020-21	Percentage change from 2000-01to 2020-21
Paddy (A)	19271	24001	41517	78675	105174	445.76
Paddy (W)	21298	26224	56819	93214	142677	569.91
Paddy (S)	24943	25861	56146	96869	145188	482.08
Coconut	21508	41746	64447	102791	169947	690.16
Banana	140433	118229	273531	452951	497306	254.12
Pepper	35688	32995	72206	322229	207707	482.01
Tapioca	39152	49377	137407	216662	328218	738.32
Ginger	68304	76215	215483	287423	498727	630.16
Turmeric	33061	57279	100837	149826	287974	771.04

Source: Report on Cost of Cultivation of Important Crops in Kerala, Dept. of Economics and Statistics, Govt. of Kerala, Various issues.

The rapid rise in the Value of output per hectare: The estimates of the gross value of output per hectare (table:5) is the sum of the Value of the output per hectare and the Value of the byproduct per hectare which is published in the Report on cost of Cultivation of essential crops in Kerala. The banana crop had the highest output value per hectare for all the time points under consideration. In 2020-21, the gross output per hectare in banana cultivation was Rs.497306. Interestingly, the increase in the Value of output of bananas was only 254%, which is the lowest compared to all the other crops under consideration. Notably, paddy cultivation's gross output value per hectare was the lowest. The highest increase in the

gross output value was witnessed in turmeric, with an increase of 771%, followed by tapioca and coconut, with an increase of 738% and 690%, respectively. Paddy Autumn, paddy winter and paddy summer witnessed an increase of 445%, 569% and 482% respectively. The productivity and price of the crop influence the gross value of output. Crops like ginger, turmeric and pepper are crops with rapid fluctuations in price.

Net returns per hectare or relative profitability

The net returns per hectare or the relative profitability of the crop are calculated by deducting the cost A of Cultivation from the gross output value per hectare. The net returns per hectare for all the crops under consideration are presented in Table 6. Banana was the most profitable crop in all the time points under consideration. The profit per hectare in banana cultivation was Rs 48580 in 2000-01, which increased to Rs 262596 in 2020-21. The profit of Pepper cultivation increased from Rs. 21750 in 2000-01 to Rs. 116597 in 2020-21. The fall in the price of pepper has seriously impacted the profit from pepper cultivation. The annual crops like ginger and turmeric recorded good profits of Rs.299481 and Rs.146306, respectively, in 2020-21. The profit from coconut cultivation increased consistently, but it was relatively lower when compared to other crops. The profit of paddy cultivation increased consistently over the years, but compared to other crops, it was the least profitable crop in the state. The low profitability could be the reason for the rapid and consistent fall in the area under the Cultivation of paddy crops in the state. Any attempt to increase the area under paddy cultivation in the state of Kerala requires steps to increase the profitability of the crop when compared to other field crops. The low profit from coconut cultivation also explains the decline in coconut cultivation in Kerala.

Table Profit per hectare based on cost A and the figures in parenthesis are profit per hectare based on Cost B (Rupees per hectare)

Crops	2000-01	2005-06	2010-11	2015-16	2020-21
Paddy (A)	2061 (-17297)	5030 (-16318)	9498 (-50360)	26852 (-16972)	35830 (-380993)
Paddy (W)	4980 (-9856)	7130 (-18709)	15686 (-65878)	38170 (-1763)	61105 (-95296)
Paddy (S)	4673 (-5457)	5804 (-12737)	18189 (-30566)	38314 (-1876)	66903 (-166976)
Coconut	8553 (-143810)	21191 (-162474)	31104 (-474292)	41362 (-283417)	77220 (-476808)
Banana	48580 (-8923)	42149 (-98701)	168628 (-170205)	276551 (98634)	262596 (-178103)

Pepper	21750 (-149950)	13121 (-243453)	34154 (-356917)	263155 (97387)	116597 (-460294)
Tapioca	14050 (-88903)	24241 (-116926)	88933 (-296851)	131280 (-79361)	187101 (-226855)
Ginger	14222 (-66486)	14380 (-100724)	103360 (-215343)	91107 (-42992)	299481 (-87502)
Turmeric	741 (-82171)	18517 (-227332)	41130 (-362024)	76201 (-48483)	146306 (-326244)

Source: Computed

Table 7 shows the Profit percentage based on cost A

Crops	2000-01	2005-06	2010-11	2015-16	2020-21
Paddy (A)	11.97	26.51	29.66	51.81	51.66
Paddy (W)	30.51	37.34	38.13	69.34	74.91
Paddy (S)	23.05	28.93	47.92	65.43	85.46
Coconut	66.02	103.09	93.28	67.33	83.27
Banana	52.88	55.40	160.74	156.77	111.88
Pepper	156.05	66.02	89.75	445.46	127.97
Tapioca	55.97	96.43	183.46	153.75	132.58
Ginger	26.29	23.25	92.18	46.40	150.31
Turmeric	2.29	47.77	68.88	103.49	103.27

Source: Computed

Profit from crop cultivation

Cost A consists of cash and kind expenses (paid-out costs) incurred by the cultivator. This includes expenses incurred for hired human labour, animal labour, machine labour, seeds, farm yard manure, plant protection, land tax, irrigation tax, repair and maintenance, interest on working capital, and other expenses. The percentage of profit over the cost A of cultivation shows that the pepper crop with a profit of 156% had the highest returns over the cost of cultivation in 2000-01. Coconut had a return of 66%, and tapioca fetched a return of 56% over the cost of Cultivation in 2000-01. Paddy showed returns of less than 30% during 2000-01. During the first two time periods, the rate of profit over cost was meagre, which could be due to the price crash and the agrarian distress during this period. The rate of profit over cost A consistently increased for all the crops. During 2015-16, pepper fetched the highest profit percentage over cost at 445%, and paddy cultivation was the least profitable. In 2020-21, ginger was the most profitable crop, recording a profit percentage of 150%, followed

by tapioca and pepper, with a profit percentage of 132% and 127%, respectively. Though the profit rate of paddy increased for all seasons, it was among the least profitable crops in the state. The relative profitability of the crops indicated why the area under paddy is dwindling in the state.

Profits when interest on land value is considered

Any discussion on agricultural cost would be complete with mentioning the interest on land value. Cost B is the sum of all operational costs plus the interest on fixed assets and land value. The interest on land value is considered for the computation of Cost B. When cost B is considered for the computation of profit rate, almost all crops show a loss, except for banana and pepper, in the final two time periods. In an earlier study, Joseph (2004) found that agricultural land prices are so high in Kerala that if the interest on land value is added to the paid-out cost of Cultivation, none of the major crops cultivated in the state are economically viable. The rationality of using interest on land value to compute the cost of Cultivation has been questioned because land value is seen to appreciate every year in stark contrast to the allowances made for depreciation of capital in the industrial sector. The argument is that capital assets depreciate, whereas land value appreciates, so why do we include interest on land value as a cost incurred in computing the cost of Cultivation? The land value appreciates due to several factors external to the agricultural sector (speculative aspects of investment in land), and it is not appropriate to include the notional costs in the computation of the cost of Cultivation. The shortage of land suitable for house construction, the population's high density, and the large influx of gulf returnees have made the land market highly speculative(Oommen, 1993).

Further, cultivators would only be willing to pay capital gains tax based on the notional land value. Therefore, it is argued that using the current land value to estimate the cost of Cultivation is conceptually inappropriate. Instead of using the market value of land to compute the interest of land value, it would be more appropriate to use rent entitlements on land (George P S 1988).

The other argument is that there is some justification for using the interest on land value as an element of the cost of Cultivation. The logic is that if money is invested anywhere else, it would have brought some returns and should, therefore, consider the element of interest on land value in the cost of Cultivation. If farming is to be considered successful when undertaken on commercial terms, the following requirements must be fulfilled. One, it must generate income to pay all farm expenses; second, it must be able to pay the prevailing interest rate on capital invested; third, it must pay reasonable wages to the farmer; and lastly, it must leave the farm as productive at the close of the year as it was at the beginning of the year's operation (Efferson, 1953). The results show that when Cost

B is considered, the profit from Cultivation is negative for almost all the crops and the whole period. The situation is similar when cost C is taken into account.

Conclusion

The post-reform period has witnessed a rapid rise in the wage rate of both male and female agricultural labourers. The first two periods from 2000-01 and 2005-06 correspond to the period of agrarian distress in Kerala when agricultural incomes, wages, and profits were considerably low. Farmers have consistently reduced the hired human labour hours used in cultivating crops. For almost all crops, the hired human labour has consistently declined, or the cultivator has resorted to a coping strategy of substituting human labour with machines. Farmers have consistently reduced the extent of wage labour as a percentage of total operational costs. This phenomenon has been seen in all the annual and field crops. However, from a historical point of view, the post-reform period has been favourable to farmers in Kerala.

The cost of cultivation for ginger and bananas is the highest among the crops considered. The output value per hectare was the highest for ginger, banana, and tapioca. Bananas, ginger and tapioca have been the most profitable crops in the state. The profitability of the paddy crop needs to be commensurate when compared to the profit accruing to other crops in Kerala. Any effort to increase the area under paddy cultivation must provide price and non-price incentives to the farmers. The farmers must be given sustained support through increased net returns from their crop cultivation. The prices of the crops must be fixed by considering the cost of cultivating the crops. An allowance must be provided to consider the land value in the cost of Cultivation and the fixation of the Minimum support price for the crops. Farmers must be protected from distress sales during glut periods by implementing government intervention in the market.

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