

## MAPPING THE COST OF CULTIVATION OF PADDY AND WHEAT IN INDIA: AN ANALYSIS OF CACP DATA

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### ABSTRACT

The analysis of CACP data show that CoC of paddy and wheat has increased enormously during the period 2006-07 to 2018-19. Although, the fixed and the operational (paid out) costs both have increased, but the later one have witnessed rapid acceleration. The relentless increase in paid out costs are due to two main reasons: first, the rollback of the State from providing cheaper farm inputs to farmers; and subsequently, second, increasing role of private operators in production and distribution of farm inputs which largely control the supply and prices of these inputs. This increase in CoC does not coincide with the increase in farm incomes of the farmers leading to aggravate the agrarian as well as rural crisis to a large extent in India.

**Keywords:** Cost of Cultivation, Operational Cost, Fixed Cost, Paddy and Wheat,

### 1.0 BACKGROUND

The deepening agrarian crisis in the neoliberal times has ravaged the farming activities in India, mostly, in two ways, first, increasing costs of cultivation (CoC) and second, dwindling produce price realization in agriculture. In the pre-1990 period, there was somewhat protectionist argument to support agriculture through providing subsidies on inputs and minimum support price for output, though there were weaknesses and sluggishness in its implementation, but the farmers took up cultivation in a protected environment (Raghvan, 2008). In the post-1991 neoliberal period, the State rolled back from actively supporting agricultural activities in the form of not just reducing the input subsidies to agriculture, but gave way to private sector to produce and distribute farm inputs and reduced its role from production, procurement and distribution of these inputs. The private sector encashed this opportunity; and they were not just were able to push the prices of these farm inputs up, but also were able to control the market of farm inputs in India (Raghvan, 2008; Verma, 2018).

One such recent role back of the State was witnessed, recently, in the post-harvest management activities in agriculture when the government enacted three farm laws<sup>1</sup>. The legislation of these laws enraged the distraught farmers who were already facing the heat of *longue durée* agrarian crisis. These enactments witnessed a massive protest by farmers and their Unions forcing the NDA government to withdraw the farm laws. One of the major demands of these farmers during the prolonged protest was to legislate a law to provide Minimum Support Prices (MSP) announced by the government for their produce based on the recommendations of the National

Commission on Farmers (NCF) (2004-06) headed by Dr. M S Swaminathan which could at least cover the cost of cultivation incurred by the farmers.

Earlier, the NCF in its comprehensive reports recommended that the MSP for a particular crop should be 1.5 times the C2 costs derived by the Commission for Agricultural Costs and Prices (CACP). C2 costs include all the paid out costs (A1)<sup>ii</sup> + rent paid for leased in land + interest on value of owned fixed capital assets (excluding land) + rental value of owned land + rent paid for leased in land + imputed value of family labour. But, the Government of India never followed the NCF formula to provide MSP to farmers; instead what, they actually are providing is 1.5 times of A2<sup>iii</sup>+Family Labour (FL) as MSP to farmers which in reality doesn't cover the cost of cultivation

In light of the above, this paper intends to capture the movement of costs of cultivation of two cereal crops, paddy and wheat, which is the largest source of household food security in India, using the costs of cultivation data provided by the CACP. The importance of these two crops can be understood in terms of their acreage sowing, i.e. paddy and wheat crops together captured almost 54 percent of the total net sown area and 38 percent of the gross cropped area in India in 2019-20<sup>iv</sup>.

The CACP, under the Directorate of Economics and Statistics (DES) of the Ministry of agriculture and Farmers' Welfare (MoAF&W), provides comprehensive data on costs of cultivation from the mid-1960s. Our analysis of the CACP data show how dramatically the Costs of Cultivation for paddy and wheat crops have increased during 2006-07 to 2018-19. We have taken three data points 2006-07, 2013-14, and 2018-19 to show the movement of variation in operational (paid out) costs of paddy and wheat crops. The average Costs of cultivation have been calculated using C2 costs. To work out the national average of costs of cultivation, area weights of paddy and wheat producing states were generated separately and were adjusted with respective state's C2 costs for these two crops. Adjusted values were added to get all states' average (all India) cost of cultivation of paddy and wheat.

## 2.0 COST OF CULTIVATION OF WHEAT AND PADDY: TRENDS

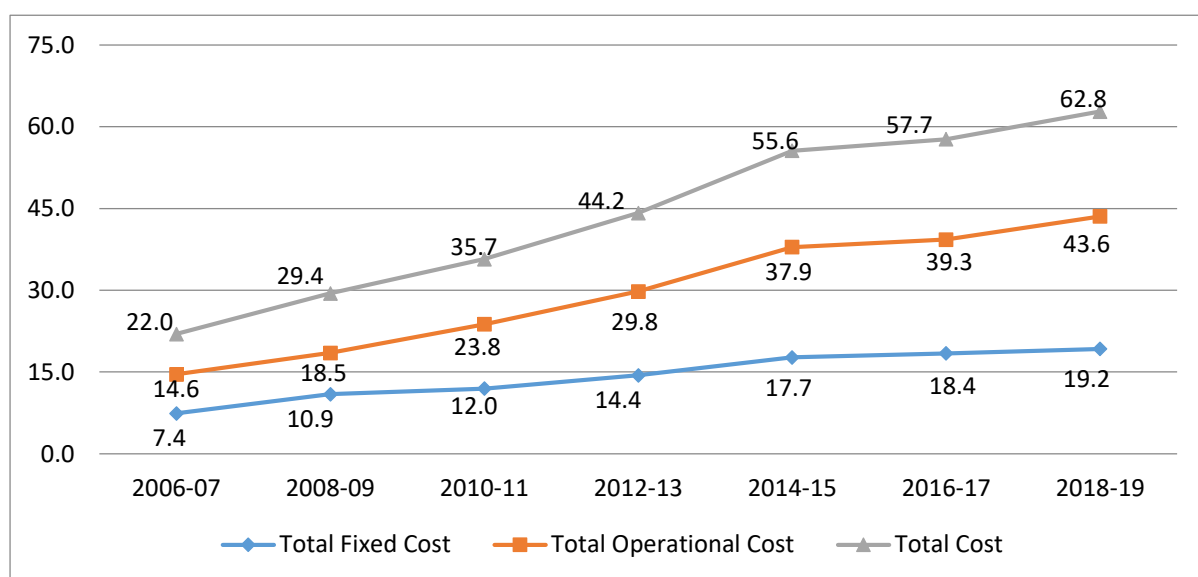
The movement of the all India average costs of cultivation (C2), operational costs<sup>v</sup> and fixed costs<sup>vi</sup> of paddy and wheat per hectare from the year 2006-07 to 2018-19 are shown in Figure 1 & 2 respectively.

The increase in fixed costs of paddy was 159.5 percent per hectare whereas the operational costs of paddy increased around 198.6 percent per hectare during 2006-07 to 2018-19. The CoC of paddy increased from Rs. 22.0 thousand per hectare to Rs. 62.8 thousand per hectare, an increase of 185.5 percent at all India level (refer Figure 1). The fixed costs for wheat crop increased 170.3 percent during the study period whereas the operational costs increased by 183.3 percent in the same period at all India level. The CoC of wheat (fixed + operational) increased from Rs. 22.3 thousand per hectare in 2006-07 to Rs. 62.0 thousand per hectare in 2018-19, an increase of 178 percent (refer Figure 2).

The spurt up in the operational costs curves of both paddy and wheat signify the fact that farmers had to incur more expenditure on variable inputs like human labour, machine labour, seeds, fertilisers and manures, insecticides, irrigation and interest on working capital. The

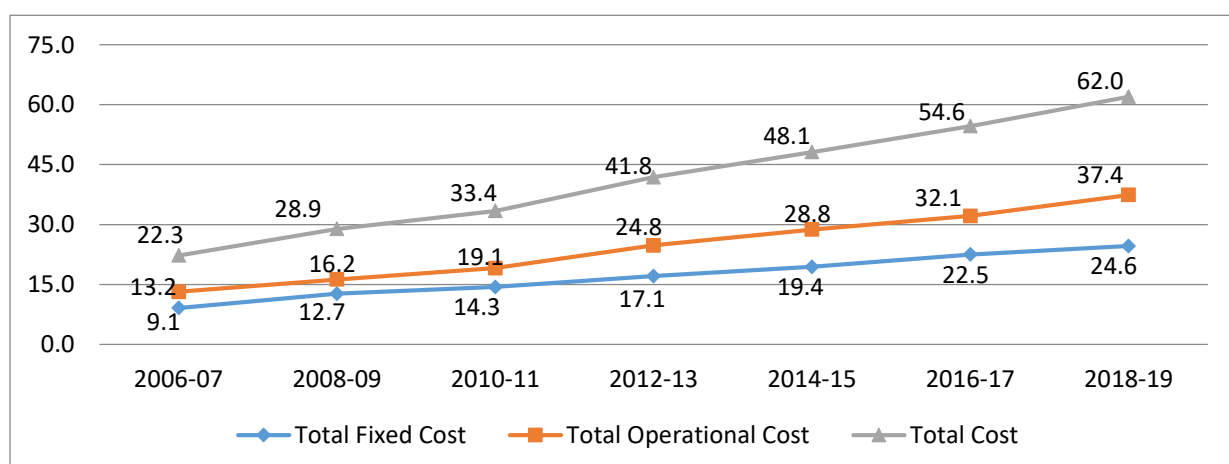
gradual upward shift in the fixed cost curve is due to the two reasons, first, the rental value of owned land and second, interest<sup>vii</sup> imputed to owned fixed assets. Rental value of owned land is estimated on the basis of prevailing rents in the village for identical type of land. If leasing of land doesn't occur in the village, the rental value is calculated from the capitalised value of land. In such a way, the fixed cost will deviate, for example, if farm prices go through a prolonged depression, the value of land will also behave in the same way (Raghavan, 2008). This prolonged depression in farm prices has caused the fixed costs to be growing slower than the operational costs. It can be seen in Figure 1 and 2 in our analysis where the fixed costs curves, for both paddy and wheat, have been flatter than the operational costs curves.

**Figure 1: Fixed Cost, Operational Cost and Total Cost of paddy in India (Rs. 000/ha)**



Source: Author's Calculation, Data provided by the CACP.

**Figure 2: Fixed Cost, Operational Cost and Total Cost of Wheat in India (Rs. 000/ha)**



Source: Source: Author's Calculation, Data provided by the CACP.

### 3.0 MOVEMENTS OF OPERATIONAL COST OF PADDY AND WHEAT

In the case of paddy, the use of human labour has declined from 105.3 person days in 2006-07 to 74.1 person days per hectare in 2018-19. The inevitable mechanisation of paddy farming has led to significant decline in person days employed in paddy cultivation. But the share of human labour wages is still half of the total operational costs (refer Table 1). The share of casual labour wages is slightly more than the half of the total human wages reflecting that a large part of cultivation of paddy takes place using hired casual labourers.

Increasing machine charges show that in the last one and half decades, there is extended use of machines for paddy cultivation. These charges increased from Rs. 1492.8 in 2006-07 to Rs. 6972.6 per hectare in 2018-19, an increase of around 367 percent over the period. The rapid spurt in machine charges are due to the reason that excessively large share of hired machine charges. The cultivators hire tractors, pump-sets, rotavators, weeders, threshers, combine machines, etc. for paddy cultivation and due to higher purchase prices of machines and due to the near abolition of energy subsidy i.e. increase in electricity and diesel prices, the charges of hired machines have gone up rapidly. The share of hired machine charges remains more than 85 percent over the period (refer Table 1).

Traditionally, production of seeds was in the hands of public sector undertakings (PSUs) namely, Indian Council for Agricultural Research (ICAR), State Agricultural Universities (SAUs), National Seed Corporation (NSC), State Farms Corporations (SFCs), State Seed Corporations (SSCs). But, first, with the Open General License (OGL) policy in 1988, the government allowed private sector to produce and distribute the non-cereal crop seeds; and second, with adoption of the National Seed Policy (NSP) in 2002, private sector was allowed for research and development (R&D), production and distribution of all types of seeds. A recent study shows that farmers use 31.65 percent farm-saved seeds, 22.70 percent from private seed dealers, 20.06 percent from research institutes, 12.71 percent from department of agriculture/cooperatives and 9.75 percent paddy seeds from authorised dealers (Pal et al., 2018). With the increase in Seed Replacement Rate (SRR)<sup>viii</sup> which was 33.08 percent<sup>ix</sup> for paddy in 2018-19, the farmers buy certified/quality seeds every year largely from the private seed dealers causing the costs of seeds to rise slowly but steadily (refer Table 1).

Per hectare fertiliser use in paddy cultivation had gone up from 120.5 kg/hectare in 2006-07 to 148.4 kg in 2017-18, which is an increase of 23.1 percent, but the fertiliser charges went up by 152.3 percent in the same period. This sharp increase in fertiliser charges were due to the shift in subsidy regime in 2010 denoted as *Nutrient Based Subsidy Scheme*. The scheme delinked subsidy and prices of chemical fertilisers that completely decontrolled the non-urea fertiliser prices. It resulted in a sharp rise in prices of fertilisers that pushed the peasantry with serious implications of increase in costs of cultivation (Bansal and Rawal, 2020).

Paddy is mainly a monsoon crop and around 51.8 percent of the net sown area under the food grains cultivation is still rainfed in India (MoA&FW, 2021). If there are scant rains, farmers are forced to spend more on irrigation. The irrigation charges went up from Rs. 783.9 per hectare in 2006-07 to Rs. 2267.3 in 2018-19, an increase of 189 percent. This increase was mainly due to increase in energy (electricity and diesel) prices vis-à-vis increase in machinery charges as well.

The *interest on working capital*<sup>8</sup> increased over the period (refer Table 1). The obvious reason for increase in interest payments on working capital might be due to the rise in bank interest rate on agricultural credit.

**Table 1: Particulars of Movement of Paid Out Costs of Paddy in India**

Particulars	2006-07	2013-14	2018-19	Change in 2018-19 from 2006-07 (% per ha)
Human Labour (person days/ha)	105.3	83.7	74.1	-29.6
Animal Labour (hours/ha)	79.0	48.5	22.0	-72.2
Human Labour Wages (Rs/ha)	7241.8	17224.9	22149.9	205.9
Human Labour Wages (as a % of Operational Cost)	49.7	53.8	50.9	2.3
Casual Labour Wages (Rs/ha)	3798.1	8718.4	11551.3	204.1
Casual Labour Wages (as % of Human Labour Wages)	52.4	50.6	52.2	-0.6
Total Machine Charges (Rs/ha)	1492.8	3938.1	6972.6	367.1
Hired Machine Charges (as % of Total Machine Charges)	87.3	89.9	86.9	-0.5
Cost of Seeds (Rs/ha)	872.0	1861.5	2491.2	187.5
Fertiliser Uses (Kg/ha)	120.5	129.1	148.4	23.1
Fertiliser Charges (Rs/ha)	1616.8	3356.3	4078.3	152.2
Insecticides Charges (Rs/ha)	313.9	832.7	1361.7	333.9

Irrigation Charges (Rs/ha)	783.9	1192.9	2267.3	189.2
Interest on Working Capital (Rs/ha)	342.8	719.3	1004.7	193.1

**Source:** Author's Calculation; based on data provided by the CACP

In case of wheat, all the indicators witnessed increase in costs as was in the case for paddy and reasons of increase in costs of cultivation of wheat remain the same, but, with minor differences due to seasonal and nature of farming. Wheat is lesser labour intensive than paddy, so the number of person days is less than half of the number of labour days being put in paddy cultivation. The share of wages in wheat cultivation was one third of the operational costs, though in absolute terms the human labour wages increased 252.3 percent per hectare over the period from 2006-07 to 2018-19. Total machine charges increased 203.1 percent, seed cost increased 124.6 percent, fertiliser charges increased by 149.2 percent and irrigation charges increased 188.6 percent in the same period (refer Table 2). The insecticides charges and interest on working capital also increased over the period for wheat cultivation.

**Table 2: Particulars of Movement of Paid Out Costs of Wheat in India**

Particulars	2006-07	2013-14	2018-19	Change in 2018-19 from 2006-07 (% per ha)
Human Labour (person days/ha)	47.0	42.2	40.3	-14.3
Animal Labour (hours/ha)	21.6	7.0	3.3	-84.8
Human Labour Wages (Rs/ha)	3572.3	9219.8	12586.0	252.3
Human Labour Wages (as a % of Operational Cost)	27.2	34.6	33.6	23.9
Casual Labour Wages (Rs/ha)	1334.2	3167.9	4395.8	229.5
Casual Labour Wages (as % of Human Labour Wages)	37.3	34.4	34.9	-6.5

Total Machine Charges (Rs/ha)	3072.8	6235.6	9312.3	203.1
Hired Machine Charges (as % of Total Machine Charges)	85.6	89.1	85.5	-0.1
Cost of Seeds	1486.6	2708.8	3338.3	124.6
Fertiliser Uses (Kg/ha)	141.6	161.6	169.6	19.8
Fertiliser Charges (Rs/ha)	1857.9	3886.5	4629.2	149.2
Insecticides Charges (Rs/ha)	194.5	341.2	466.7	140.0
Irrigation Charges	1901.2	3026.8	5486.3	188.6
Interest on Working Capital	334.0	629.2	890.3	166.6

**Source:** Author's Calculation; based on data provided by the CACP.

## 4.0 CONCLUDING REMARKS

The analysis of costs of cultivation data provided by the CACP in its comprehensive form establishes the fact that costs incurred by the farmers on paddy and wheat cultivation have increased enormously during the period 2006-07 to 2018-19. The fixed costs have increased gradually over the study period, whereas the operational (paid out) costs have witnessed rapid acceleration in the same period. The relentless increase in operational costs are due to the two main reasons: first, the rollback of the State from providing cheaper farm inputs (abolishing fertiliser, energy and machine subsidies and going away from low cost credit regime) to farmers; and subsequently, second, increasing role of private operators in production and distribution of farm inputs (mainly in seeds, fertilisers, pesticides and farm machinery) leading to escalate the costs incurred by the farmers. The increase in CoC does not coincide with the increase in farm incomes (MoSPI, 2021) in a scenario where over 93 percent cultivators are landless labourers and tenant farmers, marginal and small farmers (Verma and Roy, 2019). Thus the role back of the State just not puts the burden of increasing costs on cultivators, but aggravate the agrarian as well as rural crisis to a large extent.

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<sup>i</sup> The government brought three laws: first, the Farmers' Produce, Trade and Commerce (Promotion and Facilitation) Act, 2020; second, the Farmers (Empowerment and Protection) Agreement of Price Assurance and Farm Services Act, 2020 and third, the Essential Commodities (Amendment) Act, 2020.

<sup>ii</sup> A1 include: (i) value of hired human labour, (ii) value of hired bullock labour, (iii) value of owned bullock labour, (iv) value of owned machinery labour, (v) hired machinery charges, (vi) value of seed (both produced and purchased), (vii) value of insecticides and pesticides, (viii) value of manure (owned and purchased), (ix) value of fertilizer, (x) depreciation on implements and farm buildings, (xi) irrigation charges, (xii) land revenue, cesses and other taxes, (xiii) interest on working capital, and (xiv) miscellaneous expenses.

<sup>iii</sup> A2 includes Cost A1 + rent paid for leased in land.

<sup>iv</sup> Information gathered from the Handbook of Statistics on Indian States, 2020-21, provided by the Reserve Bank of India.

<sup>v</sup> Operational costs include all the paid-out costs incurring to the farmers when they enter into cultivation. These include expenditure on human labour, animal labour, machine labour, seed, fertiliser and manure, insecticides, irrigation and interest on working capital.

<sup>vi</sup> Fixed costs are those costs incurred whether or not the production takes place. These include rental value of owned land, rent paid for leased in land, land revenue, taxes & cesses, depreciation on implements & farm buildings and interest on fixed capital.

<sup>vii</sup> The commercial market rate of interest or an interest rate of 10 percent is applied on present value of fixed assets to impute the interest of owned fixed capital.

<sup>viii</sup> SRR is the proportion of area sown out of the total cropped area in a season by using certified/quality seeds other than the farm saved seed.

<sup>ix</sup> Lok Sabha unstarred question no. 335, answered on 19<sup>th</sup> November 2019, available at <http://164.100.24.220/loksabhaquestions/annex/172/AU335.pdf>.

<sup>x</sup> Working Capital is the difference of the value of current liabilities and current assets.