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## **Impact of Custom Hiring Centres on farm profitability – some evidences from Tamil Nadu**

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**Abstract** Custom Hiring Centres (CHC) are the trending institutional developments to boost the net income of the farmers. The study compares cost of cultivation, profitability and efficiency for farmers who availed machinery services from Government CHC and private individual farmers. The results indicated cost saving and higher yield for those availing machinery services from Government CHCs.

**Keywords** Custom hiring centres, profitability, farm mechanisation, technical efficiency

**JEL codes** O32, O43

Indian agriculture is upfronting scarcity of labour due to which there is a gradual shift from human labour and animal power to machine labour. The migration, which has significantly decreased the labour supply for agriculture, is the main cause of the labour shortage. Compared to human labour, machine power has become more cost-effective. Mechanization is crucial for achieving the goals of timeliness and effective use of natural resources. Farm mechanisation is essential for boosting rural income and agricultural output. The use of farm machinery not only boosts agricultural growth but also raises farmers' standards of living. According to World Bank estimates, half of the Indian population would be urban by the year 2050, and also percentage of agricultural workers in total workforce would reduce to 25.7% by 2050 from 58.2% in 2001. Thus, there is a need to improve the level of farm mechanisation in the country. Large landholdings require mechanical power more frequently than small and marginal land holdings. Their inability to acquire farm equipment is primarily a result of their financial situation.

Custom Hiring Centres (CHC) were established by the government to promote farm mechanisation through subsidies and to assist small and marginal farmers who are unable to afford to buy and maintain high-tech and expensive farm machineries in order to help them meet the availability of specific machinery for various operations. The Custom Hiring Centres are essentially a collection of farm machinery, implements, and equipment that farmers can rent on a hired basis. The Custom Hiring Centres were built as another institutional intervention to sustainably adapt to climate resilient technology. The primary goal of Custom Hiring Centres is to provide farm equipment to small, marginal, and low-income farmers on a rental basis at discounted rates, as well as to enhance the quality, boost crop production, and accelerate the timeliness and efficiency of agricultural operations. This makes it possible for small and marginal farmers to start their farming operations on time. In order to promote mechanisation, Government of Tamil Nadu has established 3536 CHCs during 2014-2022 for the benefit of small and marginal farmers.

### Custom Hiring Centres: an overview

Early in the 19th century, custom hiring of farm equipment was first used in Indian agriculture, when a steam thresher with a 30-inch (diameter) was employed for special hire. The devices were transported to around 10 different locations, where they operated for two to three days a piece. Midway through the 1960s, when Agro-Industries Corporation (AIC) was established in the states, organised custom hiring was made to encourage the usage of agricultural machinery across several farms. From the 1970s to the 1990s, AICs largely focused on issues of land development and tillage operation and had not yet expanded to other significant field operations. When the Indian government introduced a plan to establish agro-services centres across the nation in 1971, the custom hire of farm equipment received an additional boost. Custom recruiting services were launched in the 1990s as part of national programmes known as NATP and NAIP. The manpower usage and technical competence of KVKs are harnessed in 2010 under NICRA, by bringing in 100 KVKs spread around drought/flood/hill area and other challenging situations of agriculture, to popularise bespoke hiring services. The number of working days has decreased in modern times due to climate change and its effects, which include frequent droughts, heavy rainfall, and extreme weather events. Numerous new crop production systems and related equipment have gained popularity. Under the National Innovations in Climate Resilient Agriculture (NICRA) initiative, an ICAR Flagship Platform, CRIDA has taken the lead and developed more than 151 Custom Hiring Centres of farm equipment throughout all ecological areas in India. These Custom Hiring Centres were developed and are being run by numerous State Government Agencies, NGOs, and other entrepreneurs throughout the nation.

Sowmya *et al.* (2018) in her study on economic impact of CHC in maize cultivation in Karnataka revealed that the maize farmers have an additional profit and saved the cost of cultivation by availing services from CHC when compared to private individual farmers. The findings showed that CHC's performance in terms of net returns was determined to be negative, which was caused by the centres' dead investment. Custom hiring centres formed at block level and village level assisted in bringing the additional area of about 400 to 600 ha under cultivation in their operations and also found

that the average income generated was varying from Rs.0.5 million to Rs.1.5 million. Murugesan (2019). Hiremath *et al.* (2015) assessed the performance of CHC established by PACS and it revealed that the private owners charge higher hiring charges compared to CHC and also helped the small and marginal farmers to increase the productivity and income to the extent of 10 to 15%. Subhash *et al.* (2020) in their assessment on custom hiring centres in Khandva district of Madhya Pradesh revealed that the CHC is 100% beneficial to farmers and 70% of the farmers were satisfied with the machinery of CHCs. The study analysed the distribution of land holdings, primary and secondary occupation, education level and problems faced by CHC owners. Ranjith *et al.* (2018) estimated breakeven analysis of Custom hiring centres in Karnataka. They revealed that all the machineries owned by farmers are capable of generating high incomes which are having greater demand from the users whereas some of the machineries owned by government sponsored CHC were unable to meet even fixed and variable cost.

The present study attempts to assess the economic impact of Government sponsored custom hiring centres in maize cultivation with the specific objectives (i) to estimate the economics and profitability of maize cultivation with respect to Government-led CHCs and private individual farmers, (ii) to study the economic performance of custom hiring centres, and (iii) to assess technical efficiency of maize cultivation by availing machinery services from different sources.

### Data and method

Namakkal district was purposively selected for the study as it has maximum number of CHCs in Tamil Nadu. As maize is largely cultivated in the study area, it was purposively selected. Puduchatram and Namagiripet Block of Namakkal district were selected based on the highest number of CHCs in Namakkal district. 120 maize-growing farmers were chosen from Puduchatram and Namagiripet Blocks @ 60 per block. The respondents who had used CHC and private individual farmer services were chosen using the purposive random selection method. Regarding operations required for maize production, the degree of mechanisation was established. Farms that use machinery for land preparation, sowing, applying a base dose of fertiliser, harvesting, and threshing were classified as HMF (Highly mechanised farms). MMF

(Moderately mechanised farms) farms are those that use machinery for Land preparation, applying a base dose of fertiliser, harvesting, and threshing. LMF (Less Mechanised farms) refers to farms where only threshing and land preparation are automated. Farms were divided into two categories: those that used CHC services and privately owned farms. Primary information on the operation-wise labour and input utilisation in maize production was gathered through personal interviews for the agricultural year 2021-2022. The sources of mechanisation with hiring charges of mechanised operations were obtained from farmers. The custom hiring centre's economic performance was evaluated for the period of 2021-2022. The secondary data relating to investment made on purchasing equipment and tools, operational and fixed costs incurred for maintaining the centre, and profits produced from renting out equipment.

Profit function was estimated using profit realized per unit area as dependent variable and expenditure on human labour, machine labour, intercept dummy variables representing degrees of mechanization and sources of mechanization as independent variables in order to capture the influence of various degrees and sources of mechanization in maize cultivation.

$$Y = a + b_1X_1 + b_2X_2 + b_3D_1 + b_4D_2 + b_5D_3$$

Where, Y is the profit per hectare (Rs),  $X_1$  is the expenditure on machine labour (Rs) and  $X_2$  is the expenditure on human labour (Rs).  $D_1$  is a dummy for HMF taking the value "1" and "0" for MMF and LMF

$D_2$  – Dummy variable represent MMF which takes the value "1" and "0" for HMF and LMF

$D_3$  – Dummy variable represent sources of mechanization which takes the value "1" for CHC and "0" for private individual farmers.

$b_1, b_2, b_3, b_4, b_5$  are the regression coefficients and  $a$  – intercept.

### Data envelopment analysis

It is a non-parametric approach to measure efficiency. The effectiveness of mechanized maize farms was evaluated in this model using variable returns to scale that were cost-effective input orientated method. Mechanized maize farms were regarded as a unit of decision-making. For each DMU, the cost-DEA efficiency score took into account the amount of maize

produced per quintal (output), labour hours, man days, and machine hours, as well as the related unit costs (input). The DMU operating at 100% technical efficiency has an efficiency score of 1, while the DMU operating at a lower technical efficiency has a score below 1. The ability of the farm to produce the maximum amount of product with a specific set of inputs is referred to as its technical efficiency. The cost efficiency is the product of the technical and allocative efficiencies and is stated as a percentage. The allocative efficiency is related to the cost of inputs in relation to output.

## Results and discussion

### Profile of sample farmers

The ease of family labour availability for agricultural operations are determined by family size. Among the sample respondents, 46.6% of the farm households belonged to medium size family with four to five persons per family, 24.16% belonged to small size family with less than four persons per family and 29.16% were large families with more than five persons per family. It was observed that majority of the farmers were in the age group of 41 to 60 years, these farmers could venture into new innovations and in the adoption of technologies and cultivation practices. Educational status of the farmer determines their decision behaviour on the adoption of new technology, to a great extent. It was found that, 34.16% of the farmers having higher secondary level of education. Experience of the farming influences the decision behaviour on each and every activity involved in farming. Among the sample respondents, 36.6% of the farmers were having experience of more than 30 years in farming.

### Cropping pattern

The cropping pattern of sample maize farms is shown in Table 1. Most farmers grew maize during the kharif season, making up 51.33% of the total cultivated area followed by Jowar (17.66%), and tapioca (accounts for 8.47% of the region's total cultivated land. In the study area, cropping intensity was 109.60%. According to research of the cropping practices of maize farmers, the majority of farmers produce maize.

### Extent of mechanisation

The majority of farmers in the study area grow maize

**Table 1 Cropping pattern of mechanised maize farms**

Season	Crop	Area (acre)	% of GCA
Kharif	Sorghum	61.5	17.66
	Maize	178.75	51.33
	Groundnut	26	7.47
	Tapioca	29.5	8.47
	Onion	19.5	5.60
	Brinjal	8	2.30
	Fodder sorghum	7.25	2.08
	Cotton	9.75	2.80
	Black gram	3	0.86
	Greengram	4	1.15
Perennial	Mulberry	1	0.29
	Gross cropped area	348.25	100.00
	Net cropped area	317.75	
	Cropping intensity	109.60	

Source Primary Survey, 2021-2022

because it is used as poultry feed. It necessitates extensive cultivation, which includes operations like threshing, harvesting, inter-cultivation, and land preparation. For the aforementioned operations, the maize farmers use machineries. Based on the levels of mechanisation, the sample farms were divided into three categories: highly mechanised farms, moderately mechanised farms, and less mechanised farms.

Regarding operations required for maize production,

the degree of mechanisation was established. Farms that use machinery for land preparation, sowing, applying a base dose of fertiliser, harvesting, and threshing were classified as Highly mechanized farms (HMF). Medium mechanised (MMF) farms are those that use machinery for Land preparation, applying a base dose of fertiliser, harvesting, and threshing. Low mechanised (LMF) farms where only threshing and land preparation are automated. Sample Farms were divided into two categories: those that used CHC services and privately owned farms.

The degree of mechanisation differed across maize growers. 52.5% of the sample farmers have used machineries for land preparation and threshing operations falling under LMF category whereas compared to 32.5% of the farms are classified under MMF and 15% of farmers are under HMF category. This shows that very few percent of sample farmers have knowledge regarding mechanical devices for sowing and harvesting. In between these two extreme situations, there exist moderately mechanised farms wherein mechanical devices are being used for tillage, fertiliser application and threshing operations. Out of 120 farmers, 52.5% of the farmers were availed machineries from Government led CHC and remaining 47.5% of the farmers were availed machineries from Private individual farmers. This also clearly shows that majority of farmers were unaware of the Government led CHCs (Table 2).

**Table 2 Extent and source of mechanisation in sample maize farms**

Extent of mechanisation	Mechanised operations	No. of sample farmers	Source of mechanisation	Number of sample farmers
HMF	Land preparation			
	Sowing			
	Basal dose of fertiliser application	18		57
	Harvesting	(15)		(47.5)
	Threshing		Government led CHC	
MMF	Land preparation			
	Basal dose of fertiliser application	39		
	Harvesting/Threshing	(32.5)		
LMF	Land preparation, Threshing	63	Private individual farmers	63
		(52.5)		(52.5)
		120		120

Note Figures in the parentheses indicate percentage to total. HMF-Highly Mechanised Farm, MMF- Moderately Mechanised Farm, LMF – Less Mechanised Farm



**Economics of maize cultivation**

The economics of maize cultivation across sources of mechanisation i.e. farmers hired machinery and equipment services for maize cultivation through government-led custom hiring centres and private individual farmers (not availed machineries from government CHC) were compared and is shown in Table 3.

As shown in the table, farmers who availed equipment and machinery services from government CHCs incurred a total cost of Rs. 57860/ha whereas the farmers who availed these services from private individual farmers was Rs. 60984.50/ha. It is evident that using machinery and equipment services from the government-led CHC resulted in lower costs for growing maize compared to farmers availing machinery services from private individual farmers.

**Table 3 Economics of Maize cultivation by sources of mechanisation**

(Rs/ha)

Sources of mechanisation	Farmers availing machinery services from government CHC		Farmers availing machinery services from Private individual farmers	
	Qty	Value in Rs.	Qty	Value in Rs.
I. Machine labour (hrs)				
Land preparation	3.59	2872.00	3.64	4368.00
Sowing	1.46	1168.00	0.70	840.00
Harvesting	1.68	13440.00	1.01	9090.00
Threshing	1.21	1089.00	1.35	2025.00
Sub total	7.94	18569.00	6.70	16323.00
II. Human labour (man days)				
Sowing	15.90	7950.00	18.80	9400.00
Fertilizer application	1.60	480.00	1.84	552.00
Weeding	14.22	7110.00	17.43	8715.00
Weedicide application	1.30	390.00	1.92	576.00
PP Chemical application	1.02	306.00	1.10	330.00
Harvesting	13.24	6620.00	18.02	9010.00
Sub total	47.28	22856.00	59.11	28583.00
III. Inputs				
Seeds (kg)	18.82	6587	18.57	6499.5
Urea (bag)	2.53	759	2.61	783
DAP (bag)	1.01	1212	1.44	1728
Potash (bag)	0.69	759	0.91	1001
Complex (bag)	1.48	1998	1.02	1377
Weedicide (L)		1120		1090
PP Chemicals (L)		4000		3600
Sub total		16435.00		16078.50
Total cost (Rs/ha)		57860.00		60984.50
Yield (qtl/ha)		47.12		45.10
Price (qtl)		1500.00		1500.00
Returns from main product		70680.00		67650.00
Returns from by product		5000.00		4000.00
Gross returns		75680.00		71650.00
Net returns		17820.00		10665.50

Due to the use of seed cum fertiliser drills that could maintain an optimal plant population, farmers using government CHC services were able to produce an additional yield of 2.02 quintal. It is also evident that net profits per hectare might be increased to the tune of Rs. 7154.5/ha. Therefore, farmers might increase their profits by 67% and cut the cost of growing maize by 5.12% by using machinery and equipment from CHSCs.

### Estimated profit function

From the profit function analysis, the model's goodness of fit was 0.54, indicating that included independent variables could explain 54 per cent of the total variation in the dependent variable (profit per hectare).

The coefficient of expenditure on machine labour ( $X_1$ ) was found to be statistically significant at one per cent level of significance. The intercept dummy variables  $D_1$  and  $D_2$  capturing the influence of degrees of mechanisation in maize cultivation were found to be statistically significant at ten per cent and one per cent level of significance. The coefficient of human labour ( $X_2$ ) was statistically non-significant. The results indicate that every rupee spent on machine labour results in additional profit of Rs. 1.03. The contribution of human labour towards profit per hectare decreased the profit of Rs. 0.92. This indicates unequivocally that mechanisation increases maize farming's profitability. The magnitude of increased profits due to different degrees and sources of mechanisation is reflected in the coefficients  $D_1$ ,  $D_2$  and  $D$ . The increased profit per hectare on HMF availing mechanical services from CHSCs was Rs. 52196.46 per hectare, HMF availing services from private individual farmers was Rs. 40524.69 per hectare, MMF availing services from CHSCs was Rs. 17829.87 per hectare and MMF

availing services from private individual farmers was Rs. 16405.74. The differences in the magnitude of profits are apparent across sources of mechanisation. The estimated profits realised by HMF and MMF availing services from CHSCs were on par with each other. The expected profit per hectare on farms with various levels and sources of mechanisation was calculated and shown in Table 4 at the mean level of independent variables. This result clearly demonstrates the economic advantage of mechanisation in maize cultivation.

$$Y = 13949.13 + 1.04 X_1 - 0.93 X_2 + 1337.89 D_1 + 3813.61 D_2 + 7418.36 D$$

Profit function of HMF availing mechanical services from CHCs

$$Y = 13949.13 + 1.04 X_1 - 0.93 X_2 + 1337.89 D_1 + 7418.36 D$$

$$Y = 22705.38 + 1.04 X_1 - 0.93 X_2$$

Profit function of HMF availing mechanical services from Private individual farmers

$$Y = 13949.13 + 1.04 X_1 - 0.93 X_2 + 1337.89 D_1$$

$$Y = 15287.02 + 1.04 X_1 - 0.93 X_2$$

Profit function of MMF availing mechanical services from CHCs

$$Y = 13949.13 + 1.04 X_1 - 0.93 X_2 + 3813.61 D_2 + 7418.36 D$$

$$Y = 25181.1 + 1.04 X_1 - 0.93 X_2$$

Profit function of MMF availing mechanical services from Private individual farmers

$$Y = 13949.13 + 1.04 X_1 - 0.93 X_2 + 3813.61 D_2, Y = 17762.74 + 1.04 X_1 - 0.93 X_2$$

**Table 4 Estimated profit across different degrees and sources of mechanisation**

Particulars	Mean expenditure on			Estimated profit per hectare
	Machine labour	Human labour	Profit function	
HMF, CHC	34155	6484	$Y = 22705.38 + 1.04X_1 - 0.93X_2$	52196.46
MMF, CHC	13939	23503	$Y = 25181.10 + 1.04X_1 - 0.93X_2$	17829.87
LMF, CHC	17455	16673	$Y = 13949.13 + 1.04X_1 - 0.93X_2$	16596.44
HMF, PRIVATE	27691	3829	$Y = 15287.02 + 1.04X_1 - 0.93X_2$	40524.69
MMF, PRIVATE	17170	20660	$Y = 17762.74 + 1.04X_1 - 0.93X_2$	16405.74
LMF, PRIVATE	18775	22442	$Y = 13949.13 + 1.04X_1 - 0.93X_2$	12604.07

Profit function of LMF availing mechanical services from CHCs;

$$Y = 13949.13 + 1.04 X_1 - 0.93 X_2$$

Profit function of LMF availing mechanical services from Private individual farmers

$$Y = 13949.13 + 1.04 X_1 - 0.93 X_2$$

### Cost efficiency in maize cultivation

Cost efficiency, which takes into account both allocative and technological efficiency, was used to assess the total economic effectiveness of decision-making units. The average technical, allocative, and cost efficiency ratings for the 120 farmers in the sample were determined to be 0.97, 0.81, and 0.79, respectively. The average cost efficiency score suggested a 79% economic efficiency. Rather than technical inefficiency, the cost inefficiency was mostly caused by allocative inefficiency. Due to the inefficient allocation of scarce capital to human labour and material inputs, which are generally more expensive than machine labour, allocation inefficiency exists.

Table 5 displays the frequency distribution of cost effectiveness in maize farming across levels and sources of mechanisation. The perusal of table indicates that 100% of the HMF who used CHSCs for mechanical services were determined to be economically efficient, with a cost efficiency score of greater than 0.6. For the majority of MMF using mechanical services from CHSCs, the cost efficiency score varied from 0.4 to 0.8. Majority of the farmers

availing mechanical services from private individual farmers were found to be less efficient in terms of overall economic efficiency with cost efficiency score of 0.2-0.6. This finding reiterates the existence of economic efficiency on farms hiring mechanical services from CHSCs.

The Mean value of Technical, allocative and economic efficiency of the farmers availing machineries from CHC and private individual farmers were given in table 6.

### Investment, utilisation and returns generated by CHSC

CHCs maintain stocks of various types of machinery and equipments. They are broadly categorised into (1) tillage machinery, (2) planting and sowing machinery, (3) plant protection equipments, (4) intercultural equipments, (5) harvesting equipments, (6) post harvesting equipments and (7) other accessories presented in Table 7.

Investment made on the machineries and equipments jointly by government. Out of the total investment, investment made on harvesting and post harvesting operations accounted for 27.38 per cent and 32.97 per cent. The farmers used post harvesting implements such as chaff cutter, round baler and shredder which is used for cutting the fodder as it is mainly used for the cattle feed. Most of the farmers used harvester for harvesting maize. Investment on tillage machinery alone accounted for 24.44 per cent. The tillage equipments and machineries included tractors, tillers, disc ploughs,

**Table 5 Cost efficiency in maize cultivation for CHC and private farmers**

Cost efficiency	Farmers availing machinery services from government CHC			Farmers availing machinery services from Private individual farmers		
	HMF (n=15)	MMF (n=39)	LMF (n=3)	HMF (n=3)	MMF (n=25)	LMF (n=35)
0.2-0.4						14 (40)
0.4-0.6		10 (25.64)			9 (36)	15 (42.86)
0.6-0.8	8 (53.33)	12 (30.77)			9 (36)	3 (8.57)
0.8-1.0	7 (46.67)	17 (43.59)	3 (100)	3 (100)	7 (28)	3 (8.57)



**Table 6 Technical, allocative and economic efficiency for CHC and private individual farmers**

Source of mechanisation	Extent of mechanisation	Technical efficiency	Allocative efficiency	Economic efficiency
Farmers availing mechanical services from CHC	HMF	0.962	0.841	0.812
	MMF	0.982	0.770	0.757
	LMF	1.000	0.984	0.984
Farmers not availing mechanical services from CHC (Private)	HMF	1.000	0.890	0.870
	MMF	0.969	0.724	0.702
	LMF	0.922	0.637	0.586
Mean		0.973	0.808	0.785

**Table 7 Investment, Utilisation and Returns Generated by CHSC**

Machineries/Equipments	Investment	Hours used	Returns generated
Tillage machinery	672175 (24.44)	5429.09	2524527 (58.07)
Planting and sowing machinery	303300 (11.03)	431.66	200721.9 (4.62)
Intercultural equipments	100500 (3.65)	721.5	335497.5 (7.72)
Plant protection equipments	14700 (0.53)	125	40750 (0.94)
Harvesting equipments	753000 (27.38)	1467.14	682220.1 (15.69)
Post harvesting equipments	906400 (32.97)	941.88	563719.2 (12.96)
Total	2750075	9116.27	4347436

rotovators, cultivators, levellers, harrows, cage wheels etc., which are highly expensive and beyond the means of ordinary farmers. The maximum number of hours spent using tillage machinery and equipment was discovered to be 5429.09 hours, which produced an annual income of Rs. 25,24,527, or 58.07% of the total income. The following in line was harvesting machinery and equipment, which was used for 1467.14 hours and generated a profit of Rs. 6,82,220.1. The aforementioned table show that farmers need tillage and harvesting equipment since these two operations must be finished promptly in order to realise the potential crop output. Chaff cutters, shredders, and balers are included in the post-harvesting group and require an investment of Rs. 5,63,719.2 Frequent repairs encountered by the centre emerged as the other reason for its limited use.

### Economics of Custom Hiring Centre

Economics of working 30 CHSC was estimated and presented in Table 8.

The centre's annual maintenance costs were calculated to be a total of Rs. 57,344. The operational expenses worked out to Rs. 44,530.8 formed the major share in the total expenses (77.65 per cent). The cost of fuel for operating machinery and equipment was the largest operational expense, coming in at Rs. 34124.11 (59.51%), followed by salary at Rs. 5660.167 (9.87 per cent). 19.5% of the total costs were made up by interest on fixed investments and depreciation on machinery. The centre could, nevertheless, make a profit of Rs. 4317436. The centre's poor maintenance is reflected in the increased operating and fixed costs. The government should develop a plan to increase the

**Table 8 Economics of Custom Hiring Centres**

Particulars (n=30)	Value (Rs./yr)
Operational cost	
Fuel	34124.11 (59.51)
Lubricants	2265.694 (3.95)
Salary & wages	5660.167 (9.87)
Annual repair & maintenance	1378.056 (2.40)
Insurance	729.8611 (1.27)
Miscellaneous	372.9167 (0.65)
Sub total	44530.8 (77.65)
Fixed cost	
Depreciation	11440.93 (19.95)
Interest on fixed capital 12%	1372.911 (2.40)
Sub total	12813.84 (22.35)
Total expenses	57344.64 (100)
Total returns	4317436

employability of agricultural engineering graduates in order to boost the region's economic performance. Since it guarantees technical graduates work on the one hand and increases the centre's sustainability on the other, it is a win-win situation for the government.

## Conclusion

Comparing these farms to those that used services from private individual farmers, the economic impact was to the tune of 4.56%, 4.47%, and 61% in terms of cost savings, greater yield, and increased net returns. The profit analysis indicated that HMF availing mechanical services from CHCs was Rs. 52196.46 per hectare. The efficiency analysis indicated that cent per cent of HMF availing services from CHCs have cost efficiency score of more than 0.6. Keeping this in view, government should increase the number of CHSCs and narrow down its operational area to village level. Government

should hire and appoint technical graduates with degrees in agricultural engineering as managers of these centres in order to boost the economic performance of the centre. Nodal workshops with technical graduates should be created at taluk/district headquarters to minimise the cost associated with regular maintenance. To ensure their viability, centres should purchase equipment based on the cropping pattern that is more useful to the farming community

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