



AN ECONOMIC ANALYSIS OF COMMUNITY HIRING CENTRES (CHCs) IN CHITTOOR DISTRICT OF ANDHRA PRADESH

CH. DEEPA*, S. RAJESWARI, N. VANI AND B. RAMANA MURTHY

Department of Agricultural Economics, S.V. Agricultural College, ANGRAU, Tirupati-517 502.

Date of Receipt: 02-01-2025

ABSTRACT

Date of Acceptance: 25-03-2025

Mechanization is vital for enhancing agricultural efficiency and reducing production costs, yet small and marginal farmers face challenges such as high machinery costs and limited landholdings. Community Hiring Centres (CHCs) have emerged as a solution by offering farm machinery on a rental basis. This study, conducted in Chittoor district, Andhra Pradesh, analyzed the operational and economic aspects of CHCs. Data were collected from 30 CHC owners from three mandals: G D Nellore, Kuppam, and Punganur. Investment in CHCs ranged from ₹70,000 in smaller setups to ₹ 12,48,709 in larger Centres, with subsidies reducing costs by 32 per cent. Economic analysis revealed a Benefit-Cost ratio of 1.18, an Internal Rate of Return of 36 per cent, and a Net Present Worth of ₹ 10,51,083 from the CHCs. Payback periods varied from one to six years. Subsidies and diverse machinery ownership enhanced financial viability. Recommendations include optimizing subsidies, raising awareness, and providing technical training to CHC operators to enhance resource utilization and efficiency.

KEYWORDS: Community Hiring Centres (CHCs), Cost-Benefit Analysis, Economic Viability, Investment Pattern, Small and Marginal Farmers.

INTRODUCTION

Agriculture played a significant role in the Indian economy, contributing 17.6 per cent to the Gross Value Added (GVA) during the year 2023-24 (Agricultural Statistics at a Glance 2023, Ministry of Agriculture & Farmers Welfare, Government of India). Mechanization improved efficiency, but high costs and small landholdings hindered adoption. CHCs provided rental machinery to overcome these barriers. The study, titled "*An Economic Analysis of Community Hiring Centres (CHCs) in Chittoor District of Andhra Pradesh*," aimed to evaluate the investment dynamics and economic viability in Chittoor district, Andhra Pradesh.

Rising livestock costs, declining draft animals, urbanization, and labor migration fueled mechanization, enhancing efficiency and reducing costs. CHCs provided rental machinery to small farmers, promoting resource-sharing, agri-entrepreneurship, and equitable access to affordable mechanized farming.

In Andhra Pradesh, a predominantly agrarian state, mechanization efforts were particularly noteworthy. In Chittoor district, where 92.94 per cent of agricultural holdings were owned by small and marginal farmers (Agricultural Statistics 2023-24, www.des.ap.gov.in), mechanization faced unique challenges. Between 2021 and 2023, the state established 10,663 CHCs, with 494 of these Centres located in

Chittoor district alone. This initiative highlighted the Government's commitment to fostering mechanization and addressing the needs of smallholder farmers in the region.

MATERIAL AND METHODS

The study aimed to assess investment pattern and economic viability of Community Hiring Centres (CHCs) in Chittoor district of Andhra Pradesh state. The district was chosen purposively for its high CHC density and small farmer predominance (92.94% of holdings, 72.59% of farmland). Three mandals G D Nellore, Kuppam, and Punganur were selected based on CHC numbers. From each mandal 10 CHCs were randomly selected, totalling 30 CHCs for the study. Primary data was collected through structured schedules from CHC owners, focusing on investment, expenses, and machinery use. Secondary data from the Department of Agriculture, Andhra Pradesh, complemented the primary data. Data were systematically coded, categorized, and analyzed using various analytical tools to assess operational efficiency and investment dynamics.

Descriptive Analysis

The descriptive analysis was used to analyse the investment pattern in the establishment of Community hiring centres.

*Corresponding author, E-mail: deepanush18@gmail.com

Discounted and undiscounted measures

Discounted and undiscounted measures were employed to know the economic viability of Community Hiring Centres. Payback period was the undiscounted measure used, which means the time taken for cumulative cash inflows to equal the initial investment, with shorter periods preferred. Discounted measures like NPV, B-C ratio and IRR were employed to know the economic viability of the CHC's.

(i) Net present worth (NPW)

It is also known as Net Present Value (NPV), representing the present value of the income stream generated by an investment. NPW was calculated using the following formula.

NPW = Discounted benefits – Discounted costs.

$$NPW = \sum_{t=1}^n \frac{B_t}{(1+r)^t} - \sum_{t=1}^n \frac{C_t}{(1+r)^t}$$

or

$$NPW = \sum_{t=1}^n \frac{B_t - C_t}{(1+r)^t}$$

where,

B_t is the Annual benefits

C_t is the Annual costs

t is the number of years

r is the rate of discount.

(ii) Benefit - Cost Ratio ((BCR)

BCR was derived by dividing the present value of benefits by the present value of costs, measuring the return per unit of cost. The formula to calculate the BCR was

$$BCR \text{ or B-C Ratio} = \frac{\sum_{t=1}^n \frac{B_t}{(1+r)^t}}{\sum_{t=1}^n \frac{C_t}{(1+r)^t}} = \frac{\text{Discounted benefits}}{\text{Discounted costs}}$$

(iii) Internal Rate of Return (IRR)

IRR reflects the marginal efficiency of capital, indicating the return-generating capacity of an investment. It is the rate at which the NPW equals to zero, meaning the present value of returns equals the present value of costs. IRR can be calculated using the trial-and-error method.

$$IRR = R_1 + (R_2 - R_1) \left[\frac{NPWR_1}{NPWR_1 - NPWR_2} \right]$$

where,

R_1 = lower discount rate chosen

R_2 = higher discount rate chosen

$NPWR_1$ = NPW at lower discount rate

$NPWR_2$ = NPW at higher discount rate

RESULTS AND DISCUSSION

The average age of sample CHC owners was 46 years, with an average farming experience of 15 years. Educational attainment varied, with 40.00 per cent completing high school, 30 .00 per cent primary education and 16.67 per cent being illiterate and 13.33 per cent college education. The average landholding size was 3.09 acres, with a mix of irrigated (43.05 per cent) and rainfed (56.95 per cent) lands.

Investment Pattern of Community Hiring Centres

The results presented in Table 1 revealed that average machinery cost incurred for establishment of CHC was ₹ 10,03,907 (85.98%), for construction of Shed it was ₹ 1,49,391, for purchasing of repairing tools ₹ 14,342 and the total investment cost for establishing the CHC stood at ₹ 11,67,640. After deducting the subsidy amount the investment cost dropped to ₹ 7,93,819.

In the total machinery cost, subsidies covered ₹ 3,73,821 (37.24%), while owners contributed ₹ 1,28,133 (12.76%), and the remaining ₹ 5,01,953 (50.00%) was

Table 1. Investment Costs of establishment of CHCs in Chittoor district (in ₹)

Particulars	Amount (₹)
Machinery cost	10,03,907 (85.98)
Construction cost of the shed	1,49,391 (12.79)
Cost of repairing tools	14,342 (1.23)
Total investment cost without subsidy	11,67,640 (100.00)
Total investment cost with subsidy	7,93,819

Note: Figures in parenthesis indicates percentages

financed through bank loans. Larger CHCs owned more advanced machinery, including tractors and rotovators, while smaller ones focused on essential tools. Financial reliance on subsidies and loans made CHCs viable, especially for large-scale operations. For purchasing of machineries for CHC's subsidies up to 40.00 per cent subject to the subsidy limits stipulated under Annexure- IIC of CSS-SMAM were provided. Nagraj *et al.* (2020), Srinivas Rao *et al.* (2013), and Ranjith *et al.* (2020) highlighted subsidies' critical role in CHC establishment, reducing costs for farmers. Similarly, Singh *et al.* (2015) and Hiremath *et al.* (2014) assessed machinery investments, paralleling this study's focus on CHC investment patterns, ownership, and financial sustainability.

Economic Viability of Community Hiring Centres

The economic viability of Community Hiring Centres (CHCs) was assessed using the B-C ratio, NPW, IRR and Payback period.

Annual Cost Structure and Returns of Community Hiring Centres

The annual costs incurred by the Community Hiring Centres (CHCs) were analyzed and categorized into variable and fixed costs, with and without subsidies, alongside their respective contributions to the total cost and net returns.

The total variable costs for the CHCs amounted to ₹ 360,360, contributing to 48.27 per cent of the total annual cost. The breakdown of the total variable costs revealed that fuel Charges ₹ 156,114 (20.91%) contributes the more to the total variable costs, followed by salary to drivers ₹ 96,800, (12.97%), repairs and maintenance ₹ 100,391, (13.45%) and electricity charges ₹ 7,055 (0.95%).

Fixed costs excluding subsidies totalled to ₹ 3,86,157, accounting for 51.73 per cent of the total annual cost. Various component under fixed costs

Table 2. Annual costs and profitability analysis of community hiring centres

S. No.	Cost component	Amount (₹)	Percentage to total cost
I.	Variable costs		
1.	Salary to the drivers	96800	12.97
2.	Fuel charges	156114	20.91
3.	Repairs & maintenance	100391	13.45
4.	Electricity charges	7055	0.95
	Total variable cost	360360	48.27
II.	Fixed costs		
1.	Insurance premium	4767	0.64
2.	Rental value of shed	10900	1.46
3.	Depreciation	115330	15.45
4.	Interest on fixed capital	138396	18.54
5.	Apportioned establishment cost without subsidy	116764	15.64
6.	Apportioned establishment cost with subsidy	79372	
	Fixed costs without subsidy	386157	51.73
	Fixed costs with subsidy	348765	
III.	Total cost without subsidy	746517	100.00
IV.	Total cost with subsidy	709125	
V.	Gross returns	1082620	
VI.	Net returns without subsidy	336103	
VII.	Net returns with subsidy	373495	

Table 3. Economic viability indicators of community hiring centres

S. No.	Indicator	Without subsidy	With subsidy
1.	B-C ratio	1.18	1.32
2.	NPW @ 9% (₹)	10,51,083	16,25,431
3.	IRR (%)	36	55
4.	Pay back period (years)	4	3

include, interest on fixed capital which were, ₹ 1,38,396 making up the largest fixed costs at 18.54 per cent; apportioned establishment costs ₹ 1,16,764 (15.64 %), depreciation ₹ 1,15,330, (15.45%), rental value of shed ₹ 10,900 (1.46%), and insurance premium ₹ 4,767 (0.64%). When subsidies applied, the apportioned establishment costs dropped to ₹ 79,372, hence the total fixed costs decreased to ₹ 3,48,765.

Finally, the total cost without subsidy amounting to ₹ 7,46,517 and including the subsidies it reduced to ₹ 7,09,125. The CHCs generated gross returns worth of ₹ 10,82,620 annually and the net returns without subsidy stood at ₹ 3,36,103 and with subsidy raised to ₹ 3,73,495. Because of subsidies there was a 11.13 per cent rise in net returns.

This analysis demonstrated the economic significance of subsidies in reducing fixed costs and increasing net profitability for CHCs. Among the variable costs, fuel expenses were predominant, while interest on fixed capital and depreciation were the largest components of fixed costs.

The study aligns with Chinnappa *et al.* (2018), Hiremath *et al.* (2014), Singh *et al.* (2015), and Srinivas *et al.* (2017). Subsidies improved net returns by 11.12 per cent, demonstrating their critical role in enhancing CHC profitability and economic sustainability.

The economic viability of the CHC's were evaluated using the discounted and undiscounted measures by assuming the life span of the CHC's as 10 years. The viability was assessed using the discounted measures like B-C ratio, NPW and IRR, and undiscounted measures like Payback Period and the results were presented in Table 3 comparing efficiency indicators of the investment under two scenarios: Without Subsidy and With Subsidy.

The B-C ratio, which represented the return per rupee invested, was observed to be 1.18 without subsidy, and this improved to 1.32 when the subsidy was provided, indicating increased profitability. The Net Present Worth

(NPW) at a 9 per cent discount rate was calculated to be ₹ 10,51,083 without subsidy, which increased to ₹ 16,25,431 with subsidy, reflecting enhanced financial benefits. The Internal Rate of Return (IRR), representing the annual return on investment, was found to be 36 per cent without subsidy and was elevated to 55 per cent with subsidy, demonstrating a significant improvement in profitability. The payback period, which denoted the time required to recover the investment, was determined to be 4 years without subsidy but was reduced to 3 years with subsidy, indicating faster recovery of the initial investment. It was concluded that the subsidy improved the financial viability of the project in all aspects. For Community Hiring Centres subsidy was provided under the Scheme "Sub Mission on Agricultural Mechanization (SMAM)".

The results confirmed the economic feasibility of CHCs, supported by a favorable B-C ratio and NPW, a high IRR, and a short payback period. These indicators highlighted the robustness of CHCs as a sustainable and profitable model for agricultural mechanization services. The results were in accord with the findings of Nagraj *et al.* (2020) and Anil *et al.* (2024).

The study highlighted the economic viability of the Community Hiring Centres. The study further highlighted the importance of bank loan in the form of 50 per cent of machinery cost in establishment of CHCs. Recommendations included raising awareness of CHC schemes, optimizing subsidies, providing training, and simplifying loan processes, highlighting CHCs as economically viable and instrumental in advancing mechanized farming practices.

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