



Custom Hiring for Farm Mechanization & Degree of Satisfaction among Farmers in Vijayapur District, Karnataka, India: An Analytical Perspective

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Indian agriculture has faced a significant shortfall in farm mechanization, leading to insufficient production and productivity in various regions. Despite its critical need and benefits, farm mechanization remains largely inaccessible to small and marginal farmers, who cannot afford the necessary equipment due to their poor economic conditions. Recognized as a crucial input, farm

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mechanization enhances land productivity by ensuring timely and precise agricultural operations, reducing crop and food product losses, increasing labor efficiency by minimizing effort and drudgery, and improving the overall quality of farm activities. Custom Hiring aims to establish farm machinery banks by providing financial assistance to NGO-based or cooperative-based CHCs. Due to the prohibitive cost of advanced, high-productivity equipment, individual ownership is often impractical. Custom Hiring Centers (CHCs) address this issue by offering farm equipment and machinery on a rental basis to farmers who cannot afford to purchase high-end agricultural machinery. CHCs are instrumental in transforming farming across the country by providing affordable access to essential farm implements. This study was conducted to deepen understanding and provide a comprehensive analysis of farm mechanization and farmer satisfaction with custom hiring services in Vijayapur District, Karnataka. The research aims to assess the current state of mechanization, the extent to which these services are utilized, and the overall contentment of farmers with the available resources. Additionally, the study seeks to identify gaps in service delivery and offer insights for improving the effectiveness and accessibility of custom hiring services to better meet the needs of the farming community in this region. By evaluating these factors, the research contributes valuable information for policymakers and stakeholders to optimize farm mechanization strategies and enhance agricultural productivity.

Keywords: Mechanization; implements; Custom Hiring Centers (CHCs); status; satisfaction.

1. INTRODUCTION

In India's rural economy, agriculture remains paramount, serving as a major source of employment and livelihood generation. Its significance extends beyond rural areas, influencing the services and manufacturing sectors while addressing the food and nutritional needs of the population, thus playing a pivotal role in maintaining macroeconomic stability. As the population continues to grow, there is a pressing need to enhance agricultural efficiencies to ensure food security nationwide. Therefore, mechanization of farm activities is the need of hour to increase production, productivity and profitability in agriculture by enhancing the level of farm mechanization across the country. Utilizing efficient machinery for agricultural mechanization enhances the efficiency of input utilization, such as fertilizers and agro-chemicals, while simultaneously minimizing the adverse environmental impacts.

In India, farm mechanization plays a pivotal role in enhancing agricultural productivity and sustainability. Over the years, the adoption of modern machinery and equipment has transformed traditional farming practices, making them more efficient and productive. With the aim of reducing labor dependency, increasing crop yields, and improving overall farm operations, various initiatives and programs have been implemented by the government and agricultural organizations. Despite significant progress, challenges such as access to affordable

machinery, awareness among farmers, and infrastructural limitations persist. A primary challenge in mechanization arises from the financial constraints faced by small and marginal farmers, who often lack the means to invest in expensive agricultural machinery and equipment required for their farming activities. Consequently, the establishment of Custom Hiring Service Centers (CHSCs) emerges as a boon to farmers in overcoming this obstacle. Custom Hiring Centers (CHCs) present a practical solution by offering access to farm machinery at affordable rates. Custom hiring facilitates a farm machinery sharing practice, allowing farmers to use essential equipment without the financial burden of ownership.

The earliest instance of custom hiring in farm mechanization dates back to the 19th century in Indian agriculture, and it began in Punjab in 1912 with the introduction of a steam thresher. Custom hiring services experienced a surge in demand after the Government of India introduced a nationwide program in 1971 to establish agricultural services centers. Under the National Agricultural Technology Project (NATP) and National Agricultural Innovation Project (NAIP) programs, custom hiring was also given consideration, albeit with less priority. The Karnataka government's Department of Agriculture under "Krishi Yantradhare" program proposed in 2014 to build 186 Custom Hiring Service Centers (CHSCs) at hobli level to be managed by two Service Providers namely, Shree Kshetra Dharmastala Rural Development

Project, Dharmastala (SKDRDP) and Indian Society of Agribusiness Professionals, New Delhi (ISAP) from Rashtrya Krishi Vikas Yojana (RKVY) on a PPP model with an objective of covering of all the hoblies in a phased manner. Further during 2015-16 & 2016-17, seven centres have been established through an NGO - Kala Chetana YuvaSamsthe in Vijayapur district.

The study aims to deepen the understanding and provide a detailed depiction of the current state of farm mechanization in Vijayapur District, Karnataka, while also assessing the level of farmer satisfaction with custom hiring services. By focusing on these aspects, the research seeks to evaluate the effectiveness of mechanization efforts and identify areas where improvements can be made. The findings are intended to inform strategies that enhance the accessibility and efficiency of custom hiring services, ultimately contributing to increased agricultural productivity and better support for the farming community in the region.

2. MATERIALS AND METHODS

The present study was conducted in Vijayapur district, Karnataka, which was purposively selected due to the implementation of seven Custom Hiring Service Centers (CHSCs) across its five taluks: Vijayapur, Indi, BasavanaBagewadi, Muddebihal, and Sindagi. An ex-post facto research design was utilized, given that the phenomena had already taken place, rendering this design suitable for the study. Through a proportionate random sampling technique, participants were chosen, yielding a collective sample size of 140 farmers from each hobli (CHSCs). These farmers underwent interviews, and data were gathered using a pre-planned and pre-tested questionnaire. Primary data from the farmers was collected through well-prepared interview schedule and questionnaire. The gathered data underwent compilation, and tabular analysis was conducted to examine various attributes following in-depth discussions with experts. The secondary data related to availability of farm equipments and machineries in the CHSCs and their hiring charges was collected and compiled from the state Department of Agriculture, Annual Agriculture Statistics, Karnataka, and District Planning and statistics Department, Vijayapur, Karnataka. In the Rank Based Quotient Method, participants were requested to assess the provided statements, and their rankings were

transformed into RBQ scores utilizing the prescribed formula below:

$$RBQ = \frac{\sum Fi(n + 1 - i)}{Nn} \times 100$$

Whereas,

RBQ = Rank Based Quotient

F_i = Frequency of attributes for the i th rank of the factor

N = Number of respondents

n = Maximum number of ranks given by the respondents for the given statements

i = Rank of the attributes

3. RESULTS AND DISCUSSION

The study offers valuable insights into the state of farm mechanization across all seven CHSCs in the study area, illustrating a scenario in Table 1, where a substantial demand for tractors (24) has led to a diverse array of different types of tractors, tailored to meet the varying needs of farmers. Additionally, a well-maintained stock of tillage implements was observed, including MB ploughs (12), rotovators (31), bed preparation equipments (24), cultivators (22), and power tillers (7). The inventory of CHSCs also includes a sufficient number of sowing and planting equipment, such as seed cum fertilizer drills (30) and post hole diggers (7). Given the high demand for sprayers among farmers, CHSCs upheld a varied stock of sprayers, including Pump Sprayers (4), High Clearance Boom Sprayers (6), Rakshak Sprayers (11), and notably, Battery Operated Sprayers (23). Additionally, various other intercultural equipments were available, such as Mist Blowers (8), Brush Cutters (7), Trash Cutters (2), Pit Diggers (2), Balers (3), and more. Moreover, important equipment such as Combined Harvesters (2), Multi-crop Threshers (12), and other harvesting machinery are also available at the CHSCs of the survey locale, to farmers, to assist them and cater their demands of diverse farming practices. The studies were supported by the findings of Vanetha [1], Dash et al. [2], Jyoti [3], Srinivasarao et al. [4], Sampathkumar [5], Hiremath et al. [6], Chandrashekar [7], Shoba et al. [8], Shyam et al. [9] and Kisku & Singh [10].

Table 2 accentuates the custom hiring charges of various farm machineries offered by the Custom Hiring Service Centers (CHSCs) of the study area. The Table 2 brings to the forefront a glance of the economic condition of the study area as

well, where equipments and machineries with varied hiring fees like small Tractor (Rs.1000/day) and Tractor cum trolley (Rs.1600/day), Power tiller (Rs.350/hr), MB plough (Rs.450/hr), Cultivator (Rs.450/hr) and Rotovator (Rs.550/hr). Other equipments like Multi-crop Harvester (Rs.1500-2500/hr), Brush cutter (Rs.175/day), Battery operated Sprayer (Rs.90/hr) was also featured in the Table 2. The studies were in line with the findings of Jyoti [3], Sampathkumar [5], Murugesan [11] and Shyam et al. [9].

Table 1. Status of farm implements and machineries in all seven CHSCin Vijayapur district of Karnataka

S. No.	List of machines/ implements	Nos.	Price/unit	Total price	25% (Service providers)	75% (Govt.)
1	Mist blower	8	35000	70000	17500	52500
2	Brush cutter	7	34000	34000	8500	25500
3	Chain Saw	2	48350	48350	12087	36263
4	Square Baler	2	975000	975000	243750	731250
5	Round Baler	1	370000	370000	92500	277500
6	Trash Cutter	2	230000	230000	57500	172500
7	Pit Digger	2	126000	126000	31500	94500
8	Texas Alligator Rotary Tiller (60P)	2	89975	89975	22494	67481
9	Seed cum Fertilizer Drill	4	58000	232000	58000	174000
10	Tractor drawn Seed cum Fertilizer Drill 6 tynes	18	58000	290000	72500	217500
11	Tractor drawn seed cum fertilizer drill	12	58000	464000	116000	348000
12	Duk foot type 5 tyne Cultivator-rigid cultivator	22	38750	77500	19375	58125
13	2 bottom reversible MB Plough 35-50	12	59716	119432	29858	89574
14	Power Tiller 14.6 HP Diesel Engine	7	154000	154000	38500	115500
15	Rotavator 4 feet	1	99000	99000	24750	74250
16	Rotavator 5 feet	12	111000	111000	27750	83250
17	Rotavator 6 feet	15	113700	227400	56850	170550
18	Rotavator	1	114000	114000	28500	85500
19	Mulcher Rotavator	2	230000	460000	115000	345000
20	Post Hole Digger	7	90000	90000	22500	67500
21	Multi crop Thresher	12	166000	332000	83000	249000
22	Combine Harvester (Wheel type)	2	1835000	1835000	458750	1376250
23	744 FE Tractor	9	598536	1197072	299268	897804
24	855 FE Tractor	6	618342	618342	154586	463756
25	MF-5245 PD SJ 327 Agri Tractor	2	646900	1293800	323450	970350
26	MF-1035 Agri Tractor	2	544500	544500	136125	408375
27	MF - 9000 PD 149 28 RT OLB Agri Tractor	2	679000	679000	169750	509250
28	MF - 241PM Agri Tractor	1	573000	573000	143250	429750
29	MF - 5245 PD SJ327 Agri Tractor	2	646900	646900	161725	485175
30	Battery operated Sprayer 12 Volt DC 16 ltr tank	23	4400	13200	3300	9900
31	Horizontal Triple Piston Pump Sprayer with merinos pipe with 5 HP Petrol Engine	4	42240	168960	42240	126720
32	High clearance boom Sprayer 600 ltr protector	6	945000	945000	236250	708750
33	Rakshak Sprayer 400 ltr	11	190000	190000	47500	142500
	Grand total	217	10582309	13418431	3354608	10063823

Table 2. Variation in Custom hiring rates/ charges of implements in different CHSCs in Vijayapur district

S. No.	List of farm implements/ machinery in CHSCs	Units	Hiring charge (Rs.)
1	Trailer	Rs/load	450
2	Tractor cum trolley (with fuel)	Rs/day	1600
3	Small tractor cum trolley (with fuel)	Rs/day	1000
4	Rotavator 5ft/6ft	Rs/hr	550
5	5 tyned Rigid Cultivator	Rs/hr	450
6	Bed preparation equipments	Rs/acre	1400
7	2 bottom reversible MB Plough	Rs/hr	450
8	Disc Harrow	Rs/hr	450-500
9	Seed drill	Rs/hr	450
10	Seed cum fertilizer drill	Rs/hr	600
11	Power tiller	Rs/hr	350
12	Leveller	Rs/hr	550
13	Battery operated Sprayer	Rs/day	90
14	High clearance boom Sprayer	Rs/tank	550
15	Harvester	Rs/hr	800
16	Multicrop Harvester -	Rs/hr	
	• Sunflower, Pigeon pea, Safflower		1500
	• Chickpea		1600
	• Maize		2600
17	Groundnut harvester	Rs/bag	60
18	Post hole Digger	Rs/hr	750
19	Brush Cutter	Rs/day	175

Table 3. Degree of Satisfaction among farmers towards CHCs

S. No	Attributes	Satisfaction level of farmers					RBQ score	Rank
		HS	S	N	DS	HDS		
1	Diverse range of machinery in CHSCs to cater to various agricultural needs	72	55	9	4	0	68.21	I
2	Hiring charges of farm machineries in CHSCs	65	46	23	0	0	65.59	II
3	Functionality & credibility of farm machineries of CHSCs	56	31	43	7	3	59.13	III
4	Maintenance & repair facility	49	30	40	9	12	55.32	IV
5	Availability to skilled technical personnel	40	49	15	24	12	48.91	V
6	Access to state-of-the-art technology and equipment that aligns with contemporary farming requirements	36	45	27	17	14	45.87	VI
7	Availability of information regarding farm machinery	32	44	30	21	13	43.25	VII
8	Timely Access to required Machinery During Peak Season	27	34	5	46	28	41.64	VIII
9	Timely of required machineries during peak season	28	19	15	30	48	38.18	IX
10	Prompt access to necessary machinery during peak seasons.	17	18	11	43	51	33.41	X

HS: Highly Satisfied; S : Satisfied; N : Neutral; DS :Dissatisfied;HDS : Highly dissatisfied

Level of satisfaction of farmers is a measure of the farmers' contentment or pleasure with the farm equipments or custom hiring services provided by the CHSCs. The analysis is conducted employing the Rank Based Quotient (RBQ) method. The statement with the highest RBQ score was identified as the respondents' peak satisfaction level regarding the utilization of custom hiring services, as depicted in Table 3. The attributes are ranked based on farmers' satisfaction, with The diverse range of machineries in CHSCs to cater to various agricultural needs of farmers ranked first, indicating the highest level of satisfaction. Reflecting a more diversified viewpoint among farmers, Hiring charges of farm machineries in CHSCs, Functionality & credibility of farm machineries of CHSCs, Maintenance & repair facility are ranked second, third, and fourth respectively. Next in order while measuring the degree of satisfaction is Availability to skilled technical personnel followed by the Access to state-of-the-art technology and equipment that aligns with contemporary farming requirements to maintain and operate equipment efficiently, offer cutting-edge services tailored to local farming needs, and enhance farmer satisfaction. This leads to more reliable and sustainable agricultural practices, ultimately improving the performance and impact of CHSCs [12]. Availability of information regarding farm machinery is ranked seventh, receiving moderate satisfaction. Timely Access to required Machinery During Peak Season are also ranked eighth, indicating a similar level of satisfaction. Timely of required machineries during peak season are ranked ninth, with room for enhancement. Finally, the timely availability of required equipment during peak periods, aligned with contemporary agricultural requirements, is ranked last, indicating the least level of satisfaction. The operation of Custom Hiring Service Centers (CHSCs) faces several constraints, including inadequate access to advanced equipment, a scarcity of skilled technical staff, insufficient financial resources, and the high costs associated with equipment maintenance. Additionally, the inconsistent availability of machinery, logistical challenges, and low awareness among farmers about the services hinder CHSC efficiency [13]. Administrative inefficiencies and the complexity of establishing fair rental rates further complicate operations. Despite these challenges, the data underscores the significance of tackling pricing issues, broadening the array of

equipments choices, and enhancing performance and maintenance support to elevate farmers' overall credibility and contentment with CHCs. These improvements are crucial for enhancing farmers' trust and satisfaction with CHSC services. The studies were supported by the findings of Sampathkumar [5], Hiremath et al. [6], Chandrashekar [7], Tagore & Divya [14], Kisku & Singh [12], Nishanthi et al. [15], Nandhini et al. [16], Sharma et al. [17] and Singh et al. [18].

4. SUMMARY AND CONCLUSIONS

The research provides crucial insights into farm mechanization and the role of Custom Hiring Service Centers (CHSCs) in advancing this process. It highlights the extensive use of farm equipment and services offered by these centers, such as tractors, threshers, rotavators, seed cum fertilizer drill machines, cultivators, power tillers, post hole diggers, double reversible MB ploughs, and harvesters. The study suggests that increasing mechanization, particularly in small farms, could boost agricultural productivity and output. It also examines the demand and usage patterns of equipment, as well as the economic conditions of farmers in the Vijayapur district of Karnataka. Here, farmers commonly use various machinery types for growing crops like onion, tur, jowar, bajra, maize, wheat, millets, Bengal gram, horse gram, green gram, sunflower, safflower, niger, and sesame. They show a strong preference for tractors, tillage implements, sowing and planting equipment, intercropping machinery, and harvesting tools, choosing these based on regional needs and equipment demand.

The study also emphasizes the need to address challenges leading to farmer dissatisfaction by implementing strategies such as setting fixed hiring charges in advance, improving manpower training, raising awareness about machinery rental services at CHSCs, enhancing the availability of farm machinery, and strengthening extension efforts. Increasing awareness of the benefits of custom hiring services and streamlining administrative processes could encourage more farmers to utilize these centers. Implementing these strategies would improve farmer satisfaction with CHSCs, enhance the centers' operations, and allow them to provide higher-quality services to the farming community in the region.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc have been used during writing or editing of this manuscript. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology.

Details of the AI usage are given below:

1. ChatGPT

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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