P-ISSN 2322 - 0678 & E-ISSN 3048 - 9946
Gujarat Journal of Extension Education Vol. 40 : Issue 1 : December - 2025 https://doi.org/10.56572/gjoee.2025.40.1.0018

KNOWLEDGE AND ADOPTION LEVELS OF THE FARMERS IN MECHANIZED PADDY CULTIVATION WITH RESPECT TO FARM EQUIPMENTS AND SERVICES AVAILABLE AT CUSTOM HIRING SERVICE CENTRES

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ABSTRACT

A study to assess the role Custom Hiring Service Centres in the mechanized Paddy production was undertaken by gauging the knowledge and adoption levels of farmers of coastal taluks of Udupi district. The study revealed that the overall knowledge and adoption levels of farmers on farm implements and services available at Custom Hiring and Service Centres (CHCS) were at medium level with both Government sponsored and Private owned CHSCs users. The respondents were fully aware (100%) of tillage machineries including the tractors and tillers, advanced on-line booking facilities, availabilities of operators, technicians and experts, machinery rental charges, their repair & services, charges, mobile SMS facilities, provision of printed brochures about CHSCs. However, they were fully ignorant about the facilities of aggregator model facility and machinery working duration tracking system APP in mobiles for computing rental charges. Demonstrations and trainings offered by the Government sponsored CHSCs helped their uses to acquire and adopt the technology of seedling preparations for machine transplanting (60%); but, private owned CHSC reliant farmers, depended fully upon the supplied seedlings. Only power tiller and cage wheels were fully used by all the respondents among the tillage machineries. M.B. Ploughs and Rotary tillers were not at all used by any of the respondents.Adoption level of Plant protection equipments was limited only for the Knapsack sprayers and Gutter sprayers.Similarly, the Cono weeders were partially adopted among the Government sponsored (20.00%) and Private owned (36.67%) CHSCs users. Neither, the power weeders nor paddy threshers were adopted by any of the respondents for weeding and threshing operations. Combine harvesters were adopted because of its versatility in harvesting, threshing and bagging advantages by all the respondents.

Keywords: *mechanized paddy cultivation; custom hiring service centres; knowledge level; adoption level; farm equipment and services*

INTRODUCTION

Paddy, the ruling field crop of coastal Karnataka is an exemplary illustration for a profound blend of culture and cuisine of a region. People, here have an exceptional dietary bonding with red rice that is also a parboiled formulation and is revered with deep adoration in every walk of native tradition. However, such an integral crop of the folk-mass, facing the crisis of sharp decline in its own ground is really the paradox of progress. Paddy, what was once an omnipresent crop in every holding of the zone, is now reduced only for a mosaic appearance. The crop suffered a huge loss of 57,703 ha, accounting to 37% of the paddy growing area in the coastal districts within a quadranscentennial span (Anonymous 2018). The woes of paddy growers in the area are many. Starting from urbanization, escalation of labour costs, their scarcity, static returns, climatic vagaries and invading wild animals, all compounded their own shares in the downfall of paddy cultivation. In spite of these cascading adversaries, and district's inherent tilt for business and service sectors, the economy of the region is still heavily reliant upon agriculture. At a time, when all the odds were propped up against paddy cultivation, the most ambitious scheme of the Government of Karnataka with an aim of providing assistance of farm implements on rent through Customised Hiring Service Centres in the year 2014-15, came as solace to the locals.

Today every stage of paddy production can be managed with a set or sets of equipments that entitles the paddy production to be a "seed to seed mechanized crop". Under the circumstances of availability of most relevant equipments and services at Government sponsored and

Private owned CHSCs and availability of stage wise task based equipments at the market, how they entice the farmers to gain the knowledge and adopt in paddy production farmers remained inquisitive Therefore, the knowledge and adoption level of farmers on farm equipments required for mechanized paddy production was initiated.

OBJECTIVE

To assess the knowledge and adoption levels of farmers of the coastal taluks of Udupi district regarding farm equipment and services available at Government-sponsored and privately owned Custom Hiring Service Centres (CHSCs) for mechanized paddy cultivation

METHODOLOGY

The study was undertaken to assess the knowledge and adoption levels of the farmers of coastal taluks of Udupi district in Mechanized Paddy cultivation reliant upon the farm equipments and services of Custom Hiring Service Centres. The study area comprised Udupi and Kundapur Taluks in Udupi district; since, paddy is predominant in these coastal taluks than the interior taluks.

The farmers numbering 30 each, availing the equipments and services from the government sponsored and the private owned CHSCs on rental basis from each taluk and together making up a sample of 120 number were selected as respondents for the study. Personal interview method was employed to collect data using structured interview schedule. Under the circumstances of post event phenomenon, the researcher having no control on independent variables, *expost-facto* research design was found ideal and was employed.

The success of mechanized paddy production was said to be highly oriented to the appropriateness of the machineries in accomplishing the task (Kienzle, 2013). A thorough knowledge about the performance, ease of handling, cost and cost of operation, availability of spare parts and service, beneficial turnouts, versatility and the management of machineries naturally entice the people for their subsequent deployment in the field (Reddy, 2022).

Awareness about the farm implements, source of availability or service, usage, price or rental charges and operation and service that makeup the knowledge level of farmers with respect to mechanized paddy production could be measured by employing the "Teacher made test". A list of important machineries and services available at CHCs for paddy cultivation was presented to the farmers as a part of test and subsequently the farmers were asked to fill the framed Question-answer schedule. The valuation of the elicited answers from the farmers was gauged in accordance with the suggestions made by Anastasi (1961).

Adoption was the actual implementation of mechanized farming through the use of appropriate machineries. The level of mechanization was gauged by the formulation of a relevant schedule, that was posed to the farmers on usage of all the important and relevant machineries and services in Paddy cultivation. Scores 2, 1 and 0 were fixed for the answers full, partial and non-adoption answers respectively and the adoption level was weighed using the frequency and percentage of scores.

RESULTS AND DISCUSSION

Knowledge level of mechanized paddy cultivation through CHSC

Table 1 : Overall knowledge level of the farmers (n=120)

Sr. No.	Particulars	Government CHSC (n=60)		Private CHSC (n=60)	
		Frequency	Percent	Frequency	Percent
1	**Low**	10	16.67	6	10.00
2	**Medium**	44	73.33	43	71.67
3	**High**	06	10.00	11	18.33
		Mean=30.76	S.D=2.27	Mean=31.67	S.D=2.97

It could be noticed from Table 1, that the overall knowledge levels of respondents with respect to machineries and services available at the CHSCs, were 73.33% and 71.67% respectively with government sponsored and private owned CHSCs. Incidentally the knowledge level of respondents from both the CHCs were in medium level group on mechanised paddy production. As the region witnessed the introduction and advancement of farm mechanization at a slower phase, many farmers were still in the learning process and required thorough convincing on the benefits of mechanization (Shoba et al, 2018).

Table 2 : Overall adoption level of the farmers (n=120)

Sr. No.	Particulars	Government CHSC (n=60)		Private CHSC (n=60)	
		Frequency	Percentage	Frequency	Percentage
1	**Low**	12	20.00	05	10.00
2	**Medium**	40	63.33	45	73.33
3	**High**	04	16.67	10	16.67
		Mean=36.06	S.D=2.97	Mean=33.67	S.D=3.64

Obviously, Adoption level of the respondents (Table-2) also followed the same trend as that of knowledge. However, the respondents relying upon private owned (73.33%) CHSCs showed higher level of adoption than the respondents relying on Government sponsored (63.33 %) CHSCs. It could be inferred from the results that the slow phase of advancement of farm mechanization did influence the adoption level of mechanized paddy production as well. However, people's approach for adoption rate of mechanization in paddy production could still be considered as a positive (Shoba *et al.* (2018).

Knowledge level of respondents about the farm machineries and services available at government sponsored and private owned CHSC

Table 3 : Knowledge level of respondents about services provided bygovernment and private CHSC (n=120)

Sr. No.	Statements	Government CHSC (n= 60)		Private CHSC (n= 60)	
1	**Machineries availability**	**Frequency**	**Per cent**	**Frequency**	**Per cent**
	Availability of paddy tillage machineries	60	100.00	60	100.00
	Availability of modern machineries	60	100.00	60	100.00
	Availability of advanced booking facility	60	100.00	60	100.00
	Availability of skilled drivers and operators	60	100.00	60	100.00
	Rental charges for farm machineries	60	100.00	60	100.00
2	**Repair &services**				
	Machineries repair &services	60	100.00	60	100.00
	Availability of machineries Spare parts	25	41.67	28	46.67
	Charges for machineries Repair &services	60	100.00	60	100.00
	Fuel and lubricants availability	10	16.67	37	61.67
	Availability ofTechnicians for repairs	60	100.00	60	100.00
3	**OtherServices**				
	Availability of mobile SMS facility	60	100.00	60	100.00
	Provision of Informationthrough Printed brochures by CHC	60	100.00	60	100.00
	Availability of aggregator Model facility	0	0.00	0	0.00
	Availability of on-line advanced booking	15	25.00	12	20.00
	Availability of other inputs	13	21.67	23	38.33
4	**Advisory services**				
	Experts available at CHSC	60	100.00	60	100.00
	Schedule of training and Demonstrations from CHSC	44	73.33	25	41.67
	Availability of Mobile APP to track working duration and rental amount of machineries	0	0.00	0	0.00

All the respondents from both Government sponsored and Private owned CHSCs were fully aware about the availability of paddy cultivating machineries, modern machineries, advanced on-line booking facilities, drivers and operators, the rental charges, their repair & services, its charges, technicians, mobile SMS facilities, provision of printed brochures about CHCs and services of Experts for guidance at CHC; still, they were totally ignorant about the availability of aggregator model facility and machinery working duration tracking system APP

in mobiles for computing rental charges (Table-3). Further, only a small majority respondents knew about the availability of services of machineries spare parts (44% overall) and fuel and lubricants (39% overall). The respondents were quite aware of the services available at CHCS for on-line booking facility (overall 37.5%) and other inputs (30% overall). The Government sponsored CHSC users' knowledge level was 31.66% higher than the Private owned CHSC users on information pertaining to trainings and demonstrations. The compounding effects of literacy rate, extension contacts, awareness programmes carried out by government departments, mass media participation perceived by people along with labour scarcity issues, inability to possess farm implement, smaller holdings and personal engagements with other issues might have influenced the respondents to develop knowledge regarding most of the services of CHSCs as opined by Koike (2009).

Knowledge level on mechanized paddy cultivation imparted by CHSC

Table 4 : Knowledge level on mechanized paddy cultivation imparted by CHSC (n=120)

Sr. No.	Knowledge level	Government CHSC (n=60)		Private CHSC (n=60)	
		Frequency	Per cent	Frequency	Per cent
1	**Nursery**				
	Seed rate (kg per acre) requirement	60	100.00	60	100.00
	Mat type nursery trays requirements (per acre)	60	100.00	60	100.00
	Nursery bed preparation for Machine ransplanting	42	70.00	17	28.33
2	**Land preparation (availability, use, usage hours, hiring charges, frequency of use)**				
	Tractor	60	100.00	60	100.00
	Power tiller	60	100.00	60	100.00
	Rotovator	60	100.00	60	100.00
	M.B. plough	60	100.00	60	100.00
	Rotarytiller	41	68.33	33	55.00
	Cultivator	60	100.00	60	100.00
	Cage wheel	60	100.00	60	100.00
3	**Plantprotection**				
	Knap sack sprayer	52	86.67	52	86.67
	Gutter sprayer	43	71.67	41	68.33
	Power sprayer	28	46.67	29	48.33
	HTP sprayer	17	28.33	18	30.00
4	**Transplanting**				
	Paddy transplanter	60	100.00	60	100.00
5	**Weeding**				
	Cono weeder	47	78.33	41	68.33
	Power weeder	42	70.00	35	58.33
6	**Harvesting machineries**				
	Combined harvester	60	100.00	60	100.00
	Reaper	41	68.33	3	5.00
	Paddy thresher	60	100.00	60	100.00

(1) Nursery

The knowledge level of all the respondents was high as all the respondents were fully aware about the information pertaining to the seed rates and seedling trays requirements on acre unit (Table-4). The skill of preparing seedlings was known to whopping 70% respondents among the Government Sponsored CHSCs than meagre 28.33 % respondents of private owned. The reasons could be the influence of the trainings imparted to the farmers from government sponsored CHSCs in preparing nursery bed preparation; while, private CHCs supplied the made ready seedling trays straight away to its customers for transplanting.

(2) Land preparation

The knowledge level of respondents from both Government sponsored and Private owned were total (100%), on availability, use, usage duration, rental charges and on frequency of use of the tillage machineries covering Tractors, Power tillers, M.B. ploughs, Cultivators and Cage wheels. However, only 68.33% among Government sponsored and 55.00% among Private owned CHCs, were aware of the information on Rotary tiller. Rotary tillers were considered to be useful in seed bed preparation, intercultural operations and basin preparation around the trees; however, the equipment was rated unfit for puddling operation (Dixit 2006)

(3) Plant protection equipment

The respondents were quite aware of the use of Knapsack sprayers (86.67%) and gutter sprayers (70% overall) only. Use of rest of the sprayers, including the HTP sprayer (17.5% overall) were not familiar to them. In Udupi district, the gall midge used to be the main pest in paddy. Other pests out break used to be seen only in case of delayed transplanted paddy fields. The Zonal Agricultural Research Station, Brahmavar, way back in 1995 released a variety MO-4, that was resistant to the gall midge pest (Jakkeral, 2022). Soon the variety became the household name of the paddy grower in the entire coastal belt and currently it occupied about 90% of the rice grown area in the district. The effect of variety was so impressive that it totally suppressed the damage of Gall midge to the extent that farmers stopped spraying chemicals. Similarly, no major diseases ever emerged from the region as normal transplanting season in the district would be accomplished before the first week of August. Since, the situation did not necessitate the use of plant protection equipments, farmers also played it low to know about them.

(4) Transplanting

All the respondents from both the CHSCs were fully aware about the information on paddy transplanters. In case of traditional rice cultivation, paddy transplantation used to consume more labour than any other operation, thereby used to elevate the cost of cultivation (Rajesh Saha, 2021). In a labour scarce area, demonstrations of the paddy transplanters immediately caught the attention of farmers and they were quick to acquire the knowledge on this alternate cost reducing, rapid working and labour-saving device.

(5) Weeding

The knowledge level of the respondents about Cono weeder and Power weeders were 10% and 11.67% higher respectively among the Government sponsored CHCs users than the Private owned users Overall 68.33% and 58.33% people knew respectively the usage of Cono weeder and Power weeders among the respondents.

Simplicity, ease of operation and lower cost, particularly for small and medium-scale farms might have influenced the farmers to develop higher knowledge level about the Cono weeder.

(6) Harvesting machineries

All the respondents from both the CHCs were fully aware about the information on combined harvesters and paddy threshers. However, their awareness rates with respect to the reapers,were 41% among Government sponsored CHSC users and just 3% among Private owned CHSCs users. Being high in literacy rate, farmers in Udupi district were quick in acquiring the knowledge on multi task performing implements that promoted higher returns with reduced cost of operation, rapid turnover of work with minimum dependence on labour force like combine harvesters.

Adoption level of farmers on mechanized paddy production

Table 5 : Adoption level of mechanized paddy cultivation through CHSC (n=120)

Adoption level	Government CHSC (n=60)			Private CHSC (n=60)		
	A	PA	NA	A	PA	NA
1. Nursery						
Seed rate (kg per acre)	42 (70.00)	5 (8.34)	13 (21.67)	40 (66.67)	0 (0.00)	20 (33.33)
Mat type nursery trays (per acre)	42 (70.00)	5 (8.34)	13 (21.67)	40 (66.67)	0 (0.00)	20 (33.33)
Nursery bed preparation for machine transplanting	36 (60.00)	0 (0.00)	24 (40.00)	0 (0.00)	0 (0.00)	0 (0.00)

Adoption level	Government CHSC (n=60)			Private CHSC (n=60)		
	A	PA	NA	A	PA	NA
2. Landpre paration (use,usagehrs,frequency,hiringcharges,availability)						
Tractor	52 (86.66)	8 (13.34)	0 (0.00)	49 (81.67)	11 (18.34)	0 (0.00)
Power tiller	60 (100.00)	0 (0.00)	0 (0.00)	60 (100.0)	0 (0.00)	0 (0.00)
Rotovator	52 (86.66)	8 (13.34)	0 (0.00)	49 (81.67)	11 (18.34)	0 (0.00)
M.B.plough	0 (0.00)	0 (0.00)	60 (100.00)	0 (0.00)	0 (0.00)	60 (100.00)
Rotary tiller	0 (0.00)	0 (0.00)	60 (100.00)	0 (0.00)	0 (0.00)	60 (100.00)
cultivator	52 (86.66)	8 (13.34)	0 (0.00)	49 (81.67)	11 (18.34)	0 (0.00)
Cage wheel	60 (100.00)	0 (0.00)	0 (0.00)	60 (100.0)	0 (0.00)	0 (0.00)
3. Plant protection equipment						
Knapsack sprayer	0 (0.00)	7 (11.66)	53 (83.34)	0 (0.00)	8 (13.34)	52 (86.64)
Gutter sprayer	0 (0.00)	4 (6.67)	56 (93.33)	0 (0.00)	3 (5.00)	57 (95.00)
Power sprayer	0 (0.00)	0 (0.00)	60 (100.0)	0 (0.00)	0 (0.00)	60 (100.0)
HTP sprayer	0 (0.00)	0 (0.00)	60 (100.0)	0 (0.00)	0 (0.00)	60 (100.0)
4.Transplanting						
Paddy transplanter	42 (70.00)	5 (8.34)	13 (21.67)	40 (66.67)	0 (0.00)	20 (33.33)
5. Weeding						
Cono Weeder	0 (0.00)	12 (20.00)	48 (80.00)	0 (0.00)	22 (36.67)	38 (63.34)
Power Weeder	0 (0.00)	0 (0.00)	60 (100.0)	0 (0.00)	0 (0.00)	60 (100.0)
6. Harvesting						
Combined harvester	60 (100.0)	0 (0.00)	0 (0.00)	60 (100.0)	0 (0.00)	0 (0.00)
Reaper	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Paddy thresher	0 (0.00)	0 (0.00)	60 (100.0)	0 (0.00)	0 (0.00)	60 (100.0)

Values in parenthesis indicates percentage

A-Adopted PA-Partially Adopted NA-Not Adopted

(1) Nursery preparation

The adoption level of Seed rate usage and mat type nursery trays requirements on acreage remained even at 70% among Government sponsored CHCs users and at 66.67% among Private owned CHSCs (Table-5). Adoption of Nursery bed preparation for machine transplanting was made only by the Government sponsored CHCs users (60%) and it was not followed by the Private owned CHCS users. Government sponsored CHSC respondents were well trained in mat type seedlings preparations from the experts of government CHSC and also were exposed to the demonstrations. Commercial orientation of private CHSC through direct supply of seedling trays could have curtailed the opportunity of learning the process of preparing mat type seedling in private CHSC users.

(2) Land preparation

Only power tiller and cage wheels were fully adopted by all the respondents of both the CHCs ;while, M.B. Ploughs and Rotary tillers were seldom used by any of the respondents from either of the CHCs. Tractors, rotavators and cultivators' usage were all even at 86.66 % by the Government Sponsored CHCs and it was at 81.67%, among the respondents of the Private owned CHCs.The necessity of mechanization in the backdrop of labour scarcity, higher labour cost, and timely operations might be the motive for the farmers to get used to the simple and widely used farm equipments, usage hours and rental charges fixed by the CHSCs, frequency of use and purpose of implements and the same might have been reflected in the adoption level as well **(**Rajesh Saha,2021**).**

(3) Plant protection equipment

Plant protection equipment adoption was only partial. Knapsack sprayers were used by overall 12.5% respondents and Gutter sprayer by overall 5.8% respondents. Paddy transplanter's total adoption level in Government sponsored users were just 3.3% higher than the private owned CHCs users (66.67%). Absence of major pests and diseases in the district did not necessitate the adoption of plant protection equipments even at partial adoption level. The

findings are inline with the studies of Jakkeral et. al. (2022); Bhat et al. (2022); Bora et al. (2022); Vegad et al. (2021); Patel et al. (2023).

(4) Paddy transplanters

Higher level of adoption of transplanters from Government sponsored CHSCs (70%) and private owned CHSCs (66.67%) could be due to the labour and cost saving reasons coupled with the faster completion of the task with minimum drudgery and neat accomplishment for subsequent inter cultural operations as expressed by Reddy et.al 2022.

(5) Weeding

Only the Cono weeders were partially adopted among the Government sponsored (20.00%) and Private owned (36.67%) CHCs users. Neither, the power weeders nor paddy threshers were adopted by any of the respondents. The effective weed control by the use of Cono weeders might have impressed the farmers to adopt them and the combine harvester's usage eliminated the necessity of threshers.

(6) Harvesting

Combine harvesters were adopted by all the respondents both from Government sponsored and Private owned CHCs. Implements that saved Labour cost and scarcity, harvesting and handling loss, timely harvesting and harvesting cost played crucial role in rice production. Harvesting and threshing generally performed at a time when the maturity of crop coincides with the precarious weather condition. Cyclones in the region often hamper or spoil the whole harvesting process in paddy crop. Therefore quick harvest, threshing and bagging become imperative specifically in rice crop. Combine harvesters, in this context came very handy for the farmers as they perform all the tasks at a time with minimum labour force. This versatility of combined harvester must have influenced the overwhelming usage of the machinery (Nagaraj, 2012).

CONCLUSION

The study proved that the labour scarcity, reduction in drudgery, timeliness, versatility of implements and the savings in cost of cultivation embedded in mechanized Paddy Production had a clear edge over the traditional system and played a key role to entice farmers towards mechanization by elevating their knowledge and adoption levels. Machines that were simpler, cheaper and versatile were quick to get used to in farmers' fields without the consideration of source of origin. The overall knowledge (72.5%) and adoption levels (70%) of farmers on farm implements and services available at CHCS were in medium level in general. All the respondents were fully aware (100%) about the availability of machineries required for paddy production, their modern versions, advanced on-line booking facilities, drivers and operators availability, the rental charges, their repair, services and their anticipated charges, technicians availabilities, mobile SMS facilities, provision of printed brochures on CHCs and services of Experts for guidance at CHC; but, they were totally ignorant about the availability of aggregator model facility and machinery working duration tracking system APP in mobiles for computing rental charges.

Knowledge of raising nursery for machine transplanting was high with the government sponsored CHSC (70.00 %). Periodic trainings provided by the government sponsored CHSC might have helped its users to gain knowledge on the methodology. The Private owned CHSC users heavily relied upon the made- ready seedlings provided by their CHSC source than their own.

The knowledge levels of the respondents were total about the tillage machineries covering Tractors, Power tillers, M.B. ploughs, Rotary tillers, Cultivators and Cage wheels. However, their overall knowledge level about the rotary tiller remained was just medium (61%). As the Plant protection equipments usage were very limited in paddy and often restricted only for other crops, the respondents developed fair knowledge about these equipments. Farmers were totally aware (100%) about the use of transplanters and the combine harvesters due to their rapid and labour saving performance. Overall knowledge level of respondents on weeders was slightly higher with respect to Cono weeder (73%) than the power weeders (64%).

70%, among Government sponsored CHCs users and 66.67% among Private owned CHSCs adopted correct level of seed rate and mat type nursery trays required for an acre. Nursery bed preparation for machine transplanting used to be done only by the Government sponsored CHCs users due to the periodic trainings and demonstrations provided to them from their CHSCs. Among the Tillage machineries, only power tiller and cage wheels were in full adoption level among the respondents; while, M.B. Ploughs and Rotary tillers were not at all adopted by any of the respondents.

Labour and cost saving factors coupled with rapid turnout of the task with minimum drudgery and neat accomplishment for subsequent inter cultural operations might have influenced the respondents to adopt transplanters from Government sponsored CHSCs (70%) and private owned CHSCs (66.67%). Plant protection equipment adoption was

only partial and was limited to knapsack sprayer (12.5%) and the gutter sprayers (5.8%). Neither, the power weeders nor paddy threshers were adopted by any of the respondents. Due to the advantages of Labour and labour cost savings, timely harvesting accomplished by concurrent operations of harvesting, threshing, cleaning and bagging along with minimal handling loss in harvesting, threshing, cleaning and bagging processing, the combine harvesters might have been adopted by all the respondents in the area.

CONFLICT OF INTEREST

All authors declare that they have no conflict of interest.

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Received : October 2025 : Accepted : December 2025