

UP-SCALING FARM MACHINERY CUSTOM HIRING CENTRES IN INDIA : A POLICY PAPER



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1. Preamble

Food security of growing population is the major concern in India. This calls for improved production, which can be realized by enhancing input and energy use efficiency in agriculture through farm mechanization. However, a major chunk (85%) of the landholders fall in the category of small and marginal in the country. So, promoting small farm mechanization in the long run is the major challenge for the planners, Government Agencies and Non-Governmental Organization (NGO's) alike, who are aiming at high farm productivity and doubling of farmer's income in the country. Hence, there is an urgent need to make small farm mechanization a reality for increasing food productivity in the years ahead. The main reasons for low agricultural productivity with small and marginal farmers is poor resource base, non-adoption of improved technologies and lack of support services and enabling mechanism. Mechanization of agricultural field operations sooner than later is the need of hour in Indian agriculture system. Mechanization of agriculture, of course, has some constraints and limitations. Few of them are listed below:

- i. High initial cost often prohibits individual ownership especially amongst marginal, small and small-medium farm holders.
- ii. Limited use of machinery restricted to seasonal operation making them non profitable to farmers.
- iii. Lack of knowledge in the aspects of operation, maintenance and repair of equipment.

2. Need for Farm Mechanization

Comparing India vis-à-vis global competitors in the agricultural arena, the level of mechanization in India as of 2010-11 is ~40% while the share of the population engaged in agriculture is ~55%. The corresponding figures for developed countries like the US are 95% and 2.4% and developing country like Brazil, corresponding figures are 75% and 14.8%, depicting high intensity of manual labour involvement in India. The major farm machinery used in India includes tractors, threshers and power tillers. Among these, the biggest market in terms of annual sales is that of tractors (~6 lakh units annually), threshers (~1 lakh units annually) and power tillers (~56,000 units annually).

Food grains productivity in India has increased from 0.71 t/ha in 1960-61 to 2.15 t/ha in 2015-16, while farm power availability has increased from 0.296 kW/ha to 2.02 kW/ha during the same period (Fig.1). Thus, crop productivity is positively correlated with unit power availability in Indian agriculture. It is expected that there is a potential to increase farm power availability up to 3.30 kW/ha with the use of available traction and bullock power coupled with matching implements effectively.

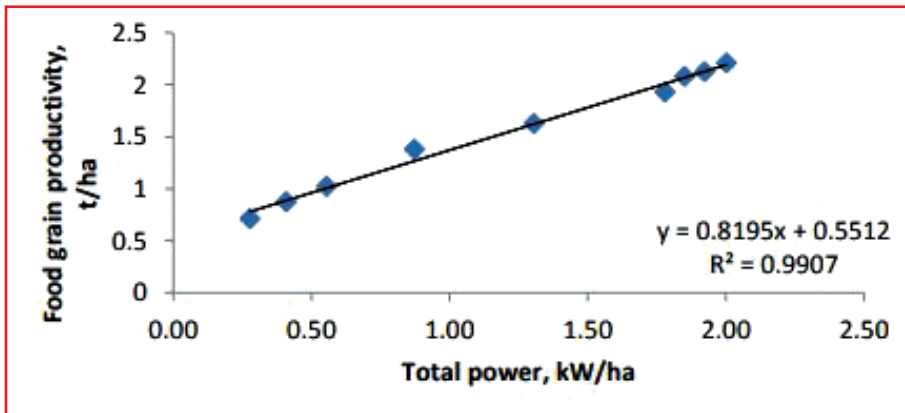


Fig. 1: Food grain productivity and power availability relationship in Indian agriculture

(Source: Singh S. *et al.*, 2014)

On the other side, progress in farm mechanization is still at low phase due to fragmentation of land holdings on time scale in Indian agriculture specifically in rainfed ecosystem (Table 1). This is considered as a major setback for dissemination of improved implements.

Table 1: Percentage of farm size holding and average size of land holdings in hectares

Farm size	Farm size holdings (%)				Average size of holdings (ha)			
	1995-96	2000-01	2005-06	2010-11	1995-96	2000-01	2005-06	2010-11
Marginal (0-1 ha)	62	63	65	67	0.4	0.4	0.38	0.39
Small (1-2 ha)	19	19	19	18	1.42	1.42	1.38	1.42
Small-Medium (2-4 ha)	12	12	11	10	2.73	2.72	2.68	2.71
Medium (4-10 ha)	6	5	5	4	5.84	5.81	5.74	5.76
Large (> 10 ha)	1	1	1	1	17.2	17.12	17.08	17.38
Overall	100	100	100	100	1.41	1.33	1.23	1.15

Source: Agricultural Census 2010-11- Ministry of Agriculture.

Intensive cultivation can only be realized through mechanization of farms. Agricultural mechanization not only eliminates the drudgery and inhumane nature of work involved in agriculture, but also raises productivity and employment (Verma, 2005). It has positive relationship with cropping intensity and new opportunities in manufacturing, service and repair sectors. Empirical evidence has time and again demonstrated that there is a strong co-relation between agricultural mechanization and agricultural productivity (Singh, 2001).

2.1 Why Farm mechanization is not successful among small holding farmers

Earlier efforts under various national programmes in the area of farm mechanization have registered around 15 - 20% higher productivity in various crops at field level apart from 30% savings in the cost of cultivation. This is because of timeliness of selective agricultural operations in addition to the precision use of inputs. However, it is pertinent to note that there is a wide gap in technology absorption capacity across various farm categories and farming systems. In spite of government departments support under various schemes, the small and marginal farm holders are unable to take the advantage, once they are withdrawn. Farmers owning less than 2 ha of land are not finding viability of owning costly farm implements and machinery as they are capital intensive. Periodic maintenance of the costly equipment followed by need based repairs are posing a big problem to the unskilled farming community because of which the individual ownership is found to be non-viable.

2.2 Need for Custom Hiring Centres

During the last few decades, climate change and its impacts such as frequent droughts, high intensive rainfall and extreme weather events have condensed the number of workable days. Keeping these factors in view, many new crop production technologies with appropriate machines have come into prominence. Establishing Custom Hiring Centres (CHCs) with expensive farm implements in villages is an important strategy to meet mechanization needs of farmers particularly from small and marginal sections. In this aspect CRIDA has taken a lead role and established more than 151 Custom Hiring Centres of farm implements across all ecological regions in India under National Innovations in Climate Resilient Agriculture (NICRA) project, an ICAR Flagship Platform. Apart from that, many of the State Government Agencies, NGOs and other entrepreneurs have established and are operating these Custom Hiring Centres in various parts of the country.

2.3 Objectives of the Custom Hiring Centres

- i. Make available various farm machinery / equipments to small and marginal farmers at affordable rent on hiring basis,
- ii. Meet timeliness of operational needs through appropriate machinery,

- iii. Facilitate farmers on application of innovative crop management practices with specific machinery and
- iv. Increase the productivity and cropping intensity by increasing the power availability at farm level.

However, the impact of all these units is not so evident at national level because of some technical and managerial constraints. Hence, there is a need to relook into the different models of CHCs, being operated across our country and also prepare a policy brief for their sustainability keeping in view the needs of majority of small farms in India.

2.4 Review of CHC systems

Custom hiring concept of farm machines was first introduced in Indian agriculture in the early decades of 19th century. Well organized custom hiring services to promote multiple farm operations by using various agricultural machinery were made in mid-1960s when Agro-Industries Corporations (AIC) were established in the states. Custom hiring of farm implements got further boost when Government of India in 1971 launched a scheme to set up Agro-Services Centres all over the country. In fact, many states started the Agro Service Centres through the State Agro Industries Development Corporations with initial focus on land development machinery only when new irrigation projects were taken up. Hiring of machinery such as tractors, dozers and land levellers, mini excavators, cranes have been widely adopted by farmers to develop their lands apart from supplying other related agricultural machineries. However, not much efforts on mechanization at farmer's level were observed.

Sharma (1974) in his study on custom hiring services and agricultural resource productivity opined that the small and marginal farmers who couldn't purchase machinery due to the price consideration, certainly were not in a position to avoid its use for some of the operations of cultivation. There is a need for accelerating the growth rate of agricultural production from about 3.7 per cent to about 7.18 per cent annually and to achieve this, productivity of marginal, small and medium category farms will have to be increased substantially by meeting their needs of additional farm power through custom hiring service (Srivastava *et al.*, 1999). Though large number of farmers in Punjab, Haryana and Western Uttar Pradesh are harvesting between 8-12 tonnes/ha but it is impossible to get 5-6 tonnes/ha and 2-3 tonnes/ha in other irrigated areas and rainfed areas, respectively. Adequate farm power availability and high capacity farm implements can help in timeliness of operation and in maximizing utilization efficiency of other inputs as well as reducing losses in storage, processing, handling and transport. The tractor was not a scale-free technology like

seeds and fertilizers, which implied that the purchase of tractor only justified if there was sufficient work throughout the year besides the usual field operations (Bhatia *et al.*, 2000). Therefore, the producers, landowners or farm managers who don't have the capital, time, or desire to perform machinery operations themselves, hiring a custom operator to perform machinery operations was an alternative method of obtaining machinery services (Beaton *et al.* 2003). For machinery owners, letting out may be a method to spread fixed costs of machinery over more acres, reducing per unit costs and increasing cash flow. Hence, the role of implements and machinery in crop production is emphasized by saying that the demand for agricultural machinery in future would be for high capacity crop production equipment mainly to be used on a custom hiring basis and on a commercial farm where the agriculture is becoming increasingly commercialized and much focus will be on saving money, time and labor (Nagarajan *et al.*, 2004).

The study on economic analysis of custom hiring of combine harvesters concluded that the combine harvesters were introduced due to the labor shortage particularly in harvesting season and uncertain weather conditions and these are very popular and adopted by all categories of farmers in the North-Western Indo-Gangetic plains of India. It has been envisaged that farmers can benefit from technological developments in terms of large machines performing farm operations (Thakur *et al.*, 2004). In custom hiring of agricultural implements in the Malwa region of Madhya Pradesh, it was found that the custom hiring enterprise spreads equipment ownership costs over larger area (Ranade *et al.*, 2006). The farm size, availability of labour and custom services, crop selection and cultural practices, all affected selection of an optimum equipment set and ultimately the number of equipments necessary for farming. These factors widened the scope of providing better implements rather than those already owned by individual farmers. Some of the initial problems in farm mechanization in India have been the small and scattered size of farm holdings, financially challenged farmers, lack of awareness among the marginal farmers and dominance of dryland agriculture (Sarkar, 2007). The need for diverse agricultural mechanization scenario in India is felt due to the country's agro-ecological diversities such as high population density and socio-economic disparities (Singh *et al.*, 2008). Tractor density in different states varied from 1.92/1000 ha in Assam to 71.43 tractors per 1000 ha in Punjab, with an all India average of meager 17.03 tractors per 1000 ha. A study was conducted to evaluate the contribution on Cooperative Agro Machinery Service Centres (AMSCs) towards improving the economic viability of farming in Punjab state (Sidhu and Vatta, 2012). Thus, it was found that the operations of the AMSCs were economically viable as the service centres generated profits to the extent of 2 to 30 per cent of the annualized costs.

Under NICRA, it was felt that there is a need to establish CHCs in villages to overcome adverse impacts of climate change through adoption of relevant farm equipment (Srinivasa Rao *et al.* 2013). In this project, management of CHC through village climate risk management committee (VCRMC) is a promising model to involve rural people in to the system for decision making in day to day operations and institutionalize the concept. A study was conducted to evaluate the performance of Cooperative Agro-Service Centres (CASC) in the cooperative sector of Punjab for providing farm machinery services indicated, an increasing level of participation of agro-service centres revealed acquisition of large numbers of farm machinery for custom hiring. The CASCs were found using both borrowed as well as owned funds for purchase of farm implements (Chahal *et al.* 2014). Subsidy provision acted as a safeguard against the risk involved in under-usage of machinery being purchased by the CASC in the initial years. The income of the CASCs increased steadily with financial support extended to such centres in terms of subsidy on one hand and increasing reach on the other.

A study on accessibility of farm machinery services through CHCs for small and marginal farmers in Karnataka state revealed that the performance of CHCs in Raichur district have greatly enabled small and marginal farmers to perform timely operations at lower cost (Hiremath *et al.* 2015). The CHCs have helped to increase the productivity and income of small and marginal farmers to the extent of 10 to 15 percent. These results show that, there is much scope for improving the performance of CHCs for the benefit of small and marginal farmers.

3. Establishment of Custom Hiring Centres

Custom hiring is an approach with an immense potential to change the farm mechanization landscape of the country with increased participation of stakeholders cutting across the farmers to the entrepreneurs with financial backup and by supplying all need based equipments for entire life cycle of a crop. The concept success can be seen at field level in terms of productivity enhancement at reduced cultivation cost if implemented in holistic manner. The system of sharing the implements on hiring basis is not new in India and has been practiced for many years but on individual implement basis. However, the systematic structural framework for the same by keeping more number of implements at one place to meet requirements of many operations had started just a decade back. ICAR-Central Research Institute for Dryland Agriculture (CRIDA), Hyderabad took lead in this aspect and established CHCs in nine locations based on major cropping systems throughout the country during the years 2003-2004. Some of them are working till date with promising results and a few got closed because of various technical issues. The impact was seen in

many villages through increased number of implements and addition of new types for different agricultural operations. In few places, the concept encouraged the farmers to purchase machinery on individual ownership basis which reduced profits of these CHCs leading to restriction on new addition of machinery. After that CHCs under different formats were established in different states with the help of funding from state exchequers, banks and other cooperative agencies. The current status of custom hiring sector in India on farm mechanization is successful only in selective interventions predominantly land preparation, sowing, spraying and harvesting with appropriate machinery. The Sub-Mission on Agricultural Mechanization (SMAM) introduced in XII plan gave very broader view for CHCs and created opportunities for implementing agencies to bridge the missing links that were discussed in earlier sections of this concept to achieve the objective. State governments of Telangana, Karnataka, Andhra Pradesh, Madhya Pradesh and Punjab have taken new initiatives and promoting Custom Hiring on Public-Private-Partnership (PPP) basis through training, demonstration and financial incentives.

After understanding the constraints, advantages and limitations in operational and establishment of CHCs, it was decided to work out the policy framework for the up-scaling CHCs at national level with a view to study selected models running in different parts of the country. Hence, a brainstorming session at CRIDA, Hyderabad was organized on 17th October, 2016. The main objective of this workshop was to prepare a policy brief for operationalization and establishment of CHCs in India for the benefit of small and marginal famers. The workshop was attended by different stakeholders including delegates from Ministry of Agriculture and Farmers' Welfare from Government of India, officials from Agro Industries Development Corporation, officials from Department of Agriculture Telangana, Andhra Pradesh, Karnataka and Gujarat States, representatives from Non Government Organizations, KVKs, progressive farmers from different states, Farm Machinery Industrialists, Senior officials from CRIDA, Officials from various zones of Agricultural Technology Application Research Institutes (ATARIs), Scientists from NAARM (National Academy of Agricultural Research Management), CIAE (Central Institute of Agricultural Engineering), delegates from Karnataka and Telangana State Agricultural Universities.

Details of the operationalization and maintenance of the CHCs operated by selected organizations are given below and they are presented as different models based on the managerial structure:

3.1 NICRA model of CHCs for small farmers (A project based model for small farm holdings)

In order to address the climatic vulnerabilities of the selected villages, different

interventions were planned under four modules. However, the specific intervention under each module for a cluster of villages was need based and finalized on the basis of climatic vulnerability and resource situation. The four modules were natural resource management, crop production, livestock and fisheries and institutional interventions. For demonstrating various climate resilient interventions related to natural resource management such as in-situ moisture conservation, biomass mulching, residue incorporation instead of burning, brown and green manuring, rain water harvesting, etc. appropriate implements were identified.

Keeping in view of small farmers, 151 CHCs were established across different ecological zones in India under NICRA project. All these centres mainly focused on small farm mechanization based on location specific needs. ICAR-Central Research Institute for Dryland Agriculture (CRIDA) took the responsibility of planning, coordination, and monitoring of the programme at national level. Eleven ATARIs earlier known as Zonal Project Directorates (ZPDs) and concerned State Agricultural Universities (SAUs) were involved in coordinating the project in their respective zones. At district level, selected KVK was responsible for implementing project in selected village through farmer's participatory approach. Interventions were mainly focused on addressing climate related constraints and not on general technology transfer.

3.1.1 Village Climate Risk Management Committee (VCRMC)

A VCRMC representing all the categories of farmers in the village is formed with the approval of *Gram Sabha*. This committee is involved in programme planning and implementation. The committee plays a vital role in the selection of need based equipment useful for the village. VCRMC participates in all discussions for finalization of interventions, selection of target farmers and area. Liaison with *Gram Panchayat* and local elected representatives helped in financial transactions under NICRA including maintaining farmer's contributions for different activities and handling of payments recovered from custom hiring centres.

3.1.2 Selection of Target Village

A village was selected based on vulnerability of agriculture to climatic variability. Highly vulnerable village gets priority in selection. Using secondary/published data, village with relatively more climatic variability like prolonged drought, dry-spells, extreme rainfall events, hailstorms, extreme temperatures, cold and heat waves, frost, flood, seawater inundation, etc. was selected (Fig.2).

3.1.3 Selection of Machinery

By following the bottom up approach and in consultation with the community, useful list of farm implements for crops grown in the particular village was prepared by the local farmers, KVK resource persons, SAU and CRIDA scientists. List was

finalized for each CHC based on budget availability and location specific needs of the community concerned. VCRMC played a key role in identification of the machinery in all the KVKs.

3.1.4 Financial support

Each CHC was initially supported by NICRA with an amount of Rs. 6.25 lakh sanctioned to each KVK for the purchase of identified implements. Apart from that additional money was also given from time to time based on the need of centres for smooth running.

3.1.5 Fixation of hiring charges

VCRMC has the option to decide hiring charges in consultation with the local farmers. Money received through rent on hiring of machinery is deposited in the VCRMC account.

3.1.6 Training to Field Staff and Farmers

Necessary trainings on skill development for operation and maintenance of the machinery are imparted to the resource persons and farmers at CRIDA and at CHCs.



Fig. 2: CHC at Bhuj, Gujarat

3.1.7 Farmer's Perception about the CHCs operated by NICRA

- It provided the equipment for agricultural operations to accomplish within timeframe.
- It created additional employment for skilled labour.

- Helped in introduction of new technologies at field level at low rentals.
- Reduced drudgery and also attracted youth towards agriculture.
- It increased the cropping intensity.
- It reduced the cost of cultivation.
- It met the timeliness of major agricultural operations and saved inputs.

3.1.8 Merits of NICRA model CHCs

- Available extension network and technical expertise of KVKs were utilized for technical backstop.
- By forming Farm machinery Service Centres/Farmers Committee, requirements of individual village/agro-climatic zone were assessed and use of equipments was tailor made as per requirement/demand.
- Revenue generation out of custom hiring service centre aided to up keep the machinery maintenance costs and in some centres added new machinery

Some of the CHCs operated under different zones are evaluated (22 in no.) for their performance, out of which 48% of them generated the revenue below Rs. 20,000/- and another 30% of the CHCs generated within the range of Rs. 20,000/- to 45,000/- and the remaining 22% of CHCs generated the income above Rs. 45,000/- and the distribution is shown in the Fig. 3.

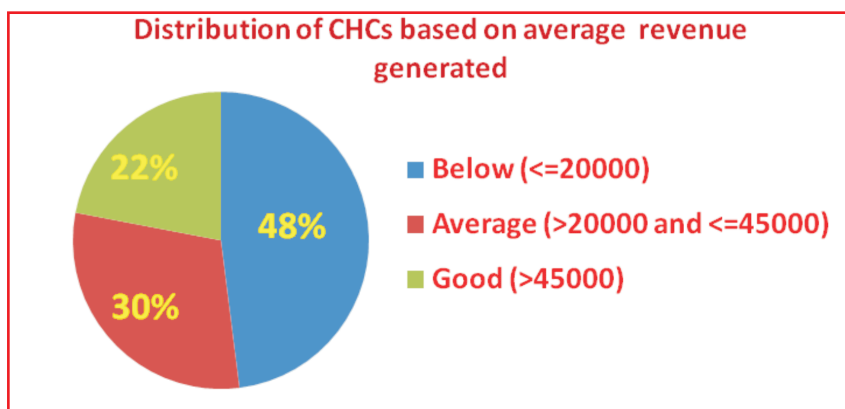


Fig 3: Distribution of CHCs based on average revenue generated per year through CHCs

The CHC that generated revenue below Rs. 20,000/- is considered as below average centre since the income is not enough even to meet the minimum maintenance of the CHC. Average grade centre is one which generated the revenue above Rs. 20,000/-

and below Rs. 45,000/- as this fund is sufficient to marginally maintain CHC. Centres that generated an income of above Rs. 45,000/- was considered sufficient to run and attend repairs of machinery in CHC. However, this particular points are limited to this NICRA model as many KVK's fixed the low rental rates for the benefit of the poor farming community in their region and necessary financial package was also given by the project.

Following points related to execution of the centres were observed during the evaluation:

- i. All centres were run by VCRMC with the help of KVK staff.
- ii. Many of the centres fixed low rental rates because of local farmers' pressure which is not viable for centre's sustainability.
- iii. Repair and maintenance of the equipment was not attempted properly by some of the centres because of which the machinery was kept idle though demand existed there.

3.1.9 Advantages observed during the evaluation of NICRA CHCs

- Stakeholders have expressed that the CHCs were useful for village.
- Mechanization in critical operations was improved because of availability of high cost machinery at village level.
- Cropping intensity was also increased in some of the areas.
- Some of the critical agronomic recommendations like intercropping and residue incorporation were taken up with advanced machinery.

3.1.10 Specific advantages observed in terms of coping with the climate variability

- Mechanization in critical operations improved with access to appropriate machinery.
- Zero tillage machines of CHCs positively impacted crop productivity (wheat, maize, rice) because of timely sowing and saving of energy and water (Fig.4).
- Crop residue burning was reduced with the introduction of rotavator, mobile chipper/ shredder and recycled back into the soil for improving soil organic carbon and soil health.
- Timely harvesting and threshing made possible as per climatic conditions.
- Cropping intensity increased in some of the areas because of timely planting, inter-culture and harvesting operations.

- Some of the critical agronomic recommendations like intercropping and residue incorporation, paired row planting were taken up in time with the help of advanced machineries like multi crop planters and mobile shredders, raised bed planter, ridger planter etc. (Fig.4 & 5).
- An additional profit of 20 to 30 % was reported by farmers besides savings on inputs to an extent of 25-30 %.



Fig. 4: Residue management through mobile shredder, Zero tillage machinery



Fig. 5: Ridger planter and castor crop

3.1.11 Constraints in CHCs of NICRA in different zones

The present NICRA model has the following major constraints:

- Maintenance cost of the equipment like rotavator, thresher, shredder etc. was not being met through the generated revenue because of low rental rates.
- Lack of skilled person services to carry the repair and maintenance which reduced the area coverage.

- iii. Farmers didn't take the responsibility of repairing equipments and at times, there was considerable delay from farmer's side in returning the equipment.
- iv. Payments were not regular for services and huge amounts accumulated as debt with the farmers.
- v. Because of lack of sufficient number of implements, demand for certain implements were not met during peak season.
- vi. Under utilization of certain equipments like reaper, power weeders, etc., during off season.
- vii. Demand for costly equipments like combine harvesters, boom sprayers, threshers, etc., which were not included in the model due to technical and financial reasons.
- viii. Differences among the farming community on priority of use of supplied implements.

3.2 CHC system in Madhya Pradesh (Individual entrepreneurship mode supported by State Government)

Government of Madhya Pradesh encouraged the individual entrepreneurs (Fig. 6) for establishing CHCs and opened up about 1300 CHCs during the last three years and details are given below:

- Eligibility: Persons below 40 years of age belonging to all categories and the applicant must be a graduate (preferably agricultural graduates).
- Each custom hiring centre costing Rs. 10 - 25 lakh.
- Subsidy 40-50 percent upto a maximum of Rs. 10 lakh. Priority was given to those farmers who obtained loans from banks for non subsidy portion of investment.
- Each unit should have at least one tractor, plough, rotavator, cultivator, disc harrow, seed-cum-fertilizer drill and one thresher. Besides these, other suitable implements can be made available on the basis of additional area and crops.
- Under the scheme tractors of 35 to 55 hp can be obtained.
- A centre will have to give tractor and agricultural implements on custom hiring for minimum ten years.
- Even if bank loan is repaid within this period, custom hiring services will have to be provided to farmers up to stipulated period. Sanctioned loan will be recovered in a maximum period of nine years.

ICAR-CIAE, Bhopal surveyed the CHCs in the state on operational and establishment and the following observations were made:

- i. Most of the centres kept the location specific implements for the benefit of the farmers and the most common implements are given below:
 - Reversible MB plough
 - Rotavator
 - Cultivator
 - Seed Drill
 - Seed cum fertilizer drill
 - Tractor mounted sprayer
 - Reaper-Binder
 - Multi crop thresher
 - Straw reaper and Trolley
 - Front Dozer
 - Disk Harrow
 - Zero-till Drill
 - Potato-Planter
 - Happy Seeder
- ii. The economics and utility part was studied and the observations are set out in Table 2.

Table 2: Utility of CHC and economics in Madhya Pradesh

Initial Investment:	14-25 lakh Rupees
Yearly profit	1.5 – 4.5 lakh Rupees
Machinery usage	500-1400 h per annum
Tractor size	50-55 hp
Use of implements	<p>Minimum use of threshers.</p> <p>Almost nil use of reapers.</p> <p>Use of seed drills is more over seed cum fertilizer drill.No power weeders are used, instead herbicide usage has increased.Primary/ Secondary processing equipment are very rare.</p>

It was observed that most of the CHCs are meeting the requirement of the farmers and are running in profits because they are running on individual entrepreneurship mode.



Fig. 6: CHC in Madhya Pradesh

3.3 CHCs in Andhra Pradesh (Farmers Groups and Crop-based Custom Hiring Centres in Irrigated Area supported by State Government)

Around 1170 CHCs have been opened in Andhra Pradesh between 2011 to 2016. All these centres are covered under 50% subsidy mode by Department of agriculture and the details are provided in Table 3.

Table 3: Number of CHCs established under various crop based package system in Andhra Pradesh

S.No.	Crop based CHCs	Numbers
1.	Paddy SMSRI Package	58
2.	Mini SMSRI Package	67
3.	Maize	24
4.	Cotton	502
5.	Groundnut	398

3.3.1 Operationalization

Farmer groups were identified through the department based on the indents received for different packages based on the prevailing cropping system and location specific needs. Subsidy amount paid to the groups varied from 50% to 70% for different social groups. An expert committee recommended need-based machinery for each

cropping system by incorporating mandatory provisions so that a common farmer will get benefit of the expertise available with the department and SAU and ICAR system. Hence, least risk was involved from farmer's side in identification of the machinery and it also helped in checking the unwanted groups to make use of the system for other purposes. A model for package of machinery for paddy based CHC is given Table 4.

Table 4: Package of machinery proposed under Custom Hiring Centre for Paddy (SMSRI):

S. No.	Machinery particulars	Quantity	Recommendations of the Expert committee
1.	Nursery Raising Machine (Manual) (or) Automatic seedling machine	1	Mandatory
2.	Nursery Trays	8000 to 10000	Mandatory
3.	6 row (or) 8 row Paddy transplanter	1	Mandatory
4.	Tractor drawn wet land leveler	1	Optional
5.	35HP and above tractor with Rotavator	1	Optional
6.	Soil pulveriser, 5 HP	1	Mandatory
7.	Power weeder	1 to 4	Optional
8.	Power tiller	1	Optional
9.	Tractor operated Laser guided land leveller	1	Optional

A paddy crop based CHC was established by Surya Rytu Mitra Group in East Godavari district of Andhra Pradesh (Fig. 7) and its economics is set out in Table 5.

Table 5: Economics of CHC established by Surya Rytu Mitra Group in East Godavari

S No.	Head	Cost /Remarks
1.	Mechanized cultivation	Rs.3700/- per acre
	Manual i.e. conventional way of cultivation	Rs.5800/- per acre
	Reduction in cost of cultivation	Rs.2100/-
2.	Increasing yield by mechanized cultivation when compared to conventional	3 bags (75 kgs) per acre adding Rs. 3000/- as additional income
3.	No. of hours of operation	1 h/acre
4.	Net amount saved by the farmer	Rs. 5100/-
5.	No. of acres covered by the CHC	1000, 1100 and 1000 acres in 2014-15, 2015-2016 and 2016-17 respectively.
6.	Hiring charges	Rs.2800/- per acre
7.	Expenditure on diesel including driver honorarium/h, etc.	Rs.1100/-
8.	Net income from the machinery	Rs. 1700/- per acre

- i. Combine Harvester 749 with eleven feet cutter bar
- ii. Tractor: 45 hp 2 WD
- iii. Rotavator: 36 blade
- iv. Multi crop planters for maize : 2 nos.
- v. Tractor drawn zero tillage seed drill

Total cost : Rs. 27.32 lakhs

Subsidy (Max. 50% subsidy) : Rs. 12.485 lakhs

3.4.2 Factors Contributing To Success:

The CHC – Maize farm mechanization is operating successfully. Initially in the village, farmers were not interested in using combine harvester, but now there is a demand for large capacity equipment. Other villages/mandal’s farmers have also shown their interest in using combine harvesters. In this package, the rental charges are less than that of private operators and the details are presented in Table 6.

Table 6: Hiring charges and profit of Mythri Rythu Mithra Sangam CHC

S.No.	Farm implement	Total hiring	charges in Rs./acre Benefit in Rs./acre
1	Combine Harvester	1800-1900	600-700
2	Tractor	1400-1500	400-500
Net profit in Rs. per annum			4 to 5 lakhs

3.5 CHC run by Agricultural Research Station (ARS), Anantapuramu (A university managed CHC supported by Government):

The custom hiring facility at ARS, Anantapuramu, ANGRAU was established under the NATP Mission mode project in 2004 with the objective to support the small farmers on mechanization aspects. After successful establishment of the CHC and visualizing the demand from farming community, it was decided to extend the same by adding multiple number machinery of same type at the farmer’s disposal. Funds from different schemes like RKVY, revolving fund scheme were being utilized to purchase specific machinery and repair and maintenance aspects were taken care by qualified technician on regular basis.

A committee was constituted in the university under the chairmanship of university head for farm machinery and power engineering scientists for technical support. Custom hiring charges were fixed for different farm implements based on their utility and are given in Table 7.

Table 7: Custom Hiring Charges for Farm Implements

S.No	Name of the Farm implement	Hiring charges per day (Rs.)
1.	Ananta Planter (Tractor Drawn)	600
2.	Bullock drawn planter	100
3.	M. B. Plough	300
4.	Duck foot cultivator	600
5.	Hand Decorticator	30
6.	Buck scrapper/Levelling blade	300
7.	Dry pod thresher	800
8.	Wet pod thresher	800
9.	Castor sheller (10 hp)	800
10.	Jawar Thresher (5.H.P)	400
11.	Groundnut Digger, shaker and Windrower	600
12.	Multi crop Thresher (10 H.P)	800
13.	Taiwan sprayer	50
14.	Tractor mounted Boom sprayer	600

In Anantapuramu district, Agricultural Research Station, Custom Hiring Centre provided farm implements to different categories of farmers covering 226 villages spread across 22 mandals. Table 8, sums up progress of custom hiring Centre at Agricultural Research Station, Anantapuramu, Andhra Pradesh for a period from April 2011 to March 2016.

Table 8: Economics and no. of farmer's benefitted

S.No.	Name of the implement	No. of farmers	benefitted Amount collected (Rs)
1.	Tractor drawn eight row Ananta planter	594	7,18,830
2.	MB plough	40	40,400
3.	Five Tyne Duck foot cultivator	25	20,700
4.	Levelling blade	6	3,450
5.	Post hole digger	10	18,800
6.	4 Row Ananta Bullock drawn planter	2	375
7.	Intercultivation equipment	4	17,000
8.	Castor Sheller	5	11,600
9.	Dry pod thresher	37	52,600
10.	Wet pod thresher	8	13,600
11.	Multi crop thresher	30	58,950
	Total	761	9,56,305

The centre progressed very well because of the technical backup from experts and also skilled workers availability at the research station. All the rentals were fixed at lower rates to serve the poor farmers of the district since the operational window is very narrow and groundnut based monocropping system is prevalent because of suitable agro-ecological conditions. The cropping intensity was also found to be increased in addition to increase in productivity at farm level as the machinery was available for critical operations like land preparation, sowing and threshing, etc.

3.6 CHCs operated by SDRDP with Karnataka Government support (A public and NGO partnership operational mode)

Based on farmer’s requirement in Karnataka State, Agriculture Department of Karnataka decided to establish Custom Hire Service Centre (CHSC) at Hobli level with an objective to assist the small and marginal farmers to provide machinery at their door step. In this direction, as per the orders of the Department of Agriculture, Government of Karnataka, SKDRDP(R) (a trust) has taken steps to establish CHSCs in selected 164 hoblis covering 25 districts.

3.6.1 Special Features

- Availability of modern equipments.
- Experienced operators/drivers.
- Availability of timely and quality service.
- Quality service.
- Service with a smile and priority for first cum and first serve without any interference.
- Advance booking facility and cancellation provision.

Brief details of the project is given in Table 9 and 10.

Table 9: Brief details about SKDRDP (R) CHSC Project

Share Holders for Project	Agriculture Department, Govt of Karnataka-75% share and Shri Kshetra Dharmasthala Rural Development Project -25% share.
Project Name	Custom Hire Service Centre (CHSC) / “Krusha Yantradhare”
Area Covered	25 Districts, 164 Selected Hoblies
Duration	2014-2020 (Total 6 years)
Total Centres	164 Centres

Table 10: Financial details of CHSC project

No. of centre	Financial Details (Rs. in lakhs)						Grand Total (Rs. in lakhs)
	First Year (2014-15)			Second Year (2015-16)			
	Govt. Grant	SKDRDP Share (Bank Loan)	Total	Govt. Grant	SKDRDP Share (Bank Loan)	Total	
1 centre	37.5	12.5	50	12.5	12.5	25	75
165 centres	6150	2050	8200	2050	2050	4100	12300

3.6.2 Machinery availability at CHCs:

CHCs are basically a unit comprising a set of farm machinery, implements and equipment meant for custom hiring by farmers. Though certain implements and equipments are crop specific, traction units like tractors, power tillers and self-propelled machineries like pump sets, sprayers, etc., are used in common. Therefore, an ideal model envisaged in this project comprised farm machinery that are commonly used for tillage operations for all crops, multi crop equipments and a minimum of crop specific machinery like post harvesting .

3.6.3 Operational Procedure:

A special set up was made by the SKRDP by keeping the managing director, executive director, directors to look after management activities and progress monitoring above hobli level and the other staff like field supervisors and managers for day to day functioning of the CHC at cluster of villages and also to advice the farmers for other agricultural service needs. Rental rates were fixed lesser than the market rate for the benefit of the clients and to attract business.

3.6.4 Repairs and maintenance:

- i. Dealers gave free repair and maintenance services during the warranty period.
- ii. CHC depended on nearest workshop on immediate repairs after warranty period.
- iii. Trained tractor drivers to take care of minor repairs and regular maintenance works.

3.6.5 Economics:

It was observed that the low rental rates which were fixed with a view to serve the farmers unable to match the breakeven point in functioning of CHCs. In addition to that many of the equipments were largely in use for only single season because of which the number of operating hours reduced. Hence, it is suggested that government should support CHCs keeping in view of the rural farmers.

4. Up-scaling the CHCs for the benefit of the farming community

After studying different models, it was observed by the delegates of Brainstorming workshop (Fig. 8) that, any one model cannot meet the requirement of all the regions across the country and they suggested some major factors which can be considered before establishing



Fig. 8: Brain storming session held at CRIDA

4.1 Major factors to be considered for establishment of Custom Hiring Centres

- i. **Identification of major crops in the nearby villages:** Cropping pattern in a cluster of villages plays a vital role in selection of farm implements. Sometimes, farmers change the cropping pattern based on the market demand. Hence, data on cultivated area under major crops is essential to understand the different types and numbers of farm implements required.
- ii. **Type of soil in the cropping area:** Soil type decides the tillage, sowing and weeding equipment efficiency. Lots of soil variation is observed throughout the country. Hence, type of soil in nearby area is to be taken in to view for finalizing the equipment.
- iii. **Identifying the critical farming operations:** Some of the farming operations need more mechanical interventions than the other operations. Priority should be given to mechanize the major operations.
- iv. **Preliminary survey on socio-economic status:** Social and economic status of majority of the farmers is to be taken in to view before establishment of the centre. Sometimes social problems may create negative impact to open the centre. Poor economic situation of the farmers needs government support to pay the minimum rental charges.

- v. **Identification of suitable farm equipment for different operations:** This is a major challenge of the total system. The performance of equipment will vary based on the crop and type of soil. Availability of cheapest power source is to be taken in to consideration. The land environmental factors are also to be considered to assess the wear and tear of equipment.
- vi. **Financial support from the loaning agencies:** The establishment of centre needs moderate funding support from the financial institutes for running the centre profitably. We need to keep adequate number of each equipment to cater the needs of cultivable area in time. Hence, the operator should have enough financial strength for mobilizing the initial and running investment.
- vii. **Availability of trained man power:** Centre needs trained technical man power for smooth running. Farmers at time demand quality service in a very short span of time to meet the timeliness of the operations. Thus, any delay in repairing will affect the customer heavily.
- viii. **Location of minor repairing industries nearby:** Very often the equipment needs timely repair. Therefore, small scale engineering workshops should be available within short range for smooth operation of the centre.
- ix. **Fixations of hiring charges:** This plays a key role in successful running of the centre. If the charges are high, the owner may get initial profits but the competition from local independent single piece equipment operators will be more. Hence, low rental charges that supports centre, depreciation of equipment and interest on finance is always better for the sustainability of the centre.
- x. **Updating the centre with new models:** Latest equipments should be made available in custom hiring centre within short time. Otherwise some of the individual owners may introduce and reach to the farmers which may directly affect the profit of centre.
- xi. **Equipment shed:** Enough space should be available for easy movement of the tractor to load and unload the equipment to meet the time factor. No implement should be kept in open area.
- xii. **Size and capacity of the machinery:** Based on the size of the land holdings, size of the machinery also varies. However, medium size equipments will always work well in small and big land holdings.

4.2 Recommendations for formulating a policy framework

- i. State and Central Governments should recognize CHCs as service industry in rural areas and extend financial support to the extent of 50-90% of total capital cost of machinery.

- ii. As the CHCs sanctioned by state agricultural departments benefit medium and large farmers with high-end machinery and small and marginal farmers are not able to reap much benefits from the existing subsidy schemes including CHCs, it is essential to device the model keeping in view the small holding farms.
- iii. Both Central and State Governments should extend input subsidy (about 50%) to hiring charges of various implements of CHCs used by farmers. Particularly small and marginal farmers should get preference for financial sustenance of CHCs over the long-run.
- iv. Linking of CHCs with other Government schemes related to agriculture, horticulture and animal husbandry is necessary to facilitate selection of relevant farm implements, capacity building of stakeholders and to improve sustainability.
- v. States Departments of Agriculture should take initiative for co-ordination of hands-on training and skill development activities for interested rural youth and agriculture/horticulture diploma holders in collaboration with SAU's and ICAR Institutes. This will help in reducing the gap between demand and supply of skilled manpower and to retain the youth in agriculture. There is a need to formulate rules and guidelines to establish CHCs.
- vi. A unified model of CHCs may not be successful in all zones as the machinery requirements are highly crop as well as location specific and the socio-economic condition of farmers also vary from one location to other. Hence, CHC model should be location specific with strong leadership and in built with other essential support services.
- vii. CHCs should also be established on Public Private Partnership (PPP) mode wherever possible.
- viii. Encouraging the CHCs on individual entrepreneurship may provide better results when supported with major contribution from Government as the bankers mostly look for economic returns and viability of the project rather than service motto of the project.

5. Conclusions

In this policy paper, various aspects such as purpose, mode of establishment, operationalization, merits and demerits of CHCs run by different organizations have been reviewed. It was clearly observed that the CHCs are very useful to farming community in general while small, marginal, semi-medium farmers in particular. In majority of cases, except in individually farmer owned and run centres, the income generated was not sufficient to run the CHCs on long-term basis. In some cases,

there was no demand for some implements where package wise machinery mode of selection was adopted. So, there should be a mid-term correction provision to replace the unpopular ones with need based machinery. Some of the CHCs supported by the government with significant portion of subsidy backup are working with marginal profits, but the long term sustainability of such centres will depend on the future business volume. Therefore, the government should extend the financial support to the extent of 50 to 90% of total capital cost including the shed and other infrastructure facilities. At the same time an input subsidy of 50% on rental cost should be extended to the small and marginal farmers whoever utilizes the services of CHCs which will boost the productivity and reduce the cost of cultivation. Apart from that, the personnel involved in CHC management should be trained enough to run the CHC in entrepreneurship mode.

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