

# Custom hiring: The catalyst for inclusive farm mechanization and Viksit Bharat

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*Farm mechanization provides multiple benefits. Custom hiring of farm mechanization is likely to benefit the farmers by reducing the capital burden, improving machine utilization, reducing per-unit costs, and ensures timely field operations with precision, particularly in rainfed agriculture. Climate-smart mechanization via custom hiring must become a central pillar of transformation in agriculture. This approach focuses on energy-efficient and low-emission technologies, precision farming tools for optimal resource use, and machinery that supports sustainable practices. In India, operationally sustainable and economically feasible custom hiring centres network, is likely to bridge the mechanization gap, enhance agricultural resilience, and move decisively towards the vision of a "Viksit Bharat".*

**Keywords:** Custom hiring, Climate-smart mechanization, Farm mechanization

**T**HE increased use of improved technologies in Indian agriculture since the mid-sixties has led to a multi-fold increase in agricultural production. Modern agriculture, with its growing reliance on commercial inputs, demands enhanced use-efficiency which is achievable only through timely and precise application using advanced agricultural machinery. This has amplified the need for higher levels of mechanization. Agriculture depends on seven vital inputs: Seed, fertilizer, irrigation water, plant protection chemicals, agro-machinery, transfer of knowledge, and credit. Among these, agro-machinery serves as the engineering backbone and its efficiency directly influences the effectiveness and precision of all other inputs. Mechanization enhances timeliness of operations, which is essential for maintaining crop cycles, improving productivity, and reducing losses. Mechanization brings tangible benefits to the field like:

- 15–20% savings in seeds and fertilizers through precision application
- 5–20% increase in cropping intensity, enabling multiple cropping
- 20–30% reduction in time and manual labour, helping address rural labour shortages
- 10–15% rise in overall farm productivity, contributing to food security and income growth

The cropping intensity in Indian agriculture increased from 120% in 1975–76 to 142% in 2021–22, corresponding with a significant increase in farm power

availability from 0.36 kW/ha to 3.04 kW/ha during the same period. Notably, the net sown area per tractor declined from 487 ha/tractor in 1975–76 to just 15 ha/tractor in 2021–22, reflecting rapid proliferation of tractors and greater mechanization at smaller scales. India is now the world's largest manufacturer and exporter of tractors, with the market valued at USD 7.54 billion in 2020, expected to grow to USD 12.7 billion by 2030. Tractors alone make up nearly 80% of India's total farm machinery, with threshers and rotavators closely following.

With increasing cropping intensity, Indian farmers have steadily shifted from animate power to mechanical sources like tractors, power tillers, diesel engines, and electric motors. The availability of draught animal power has come down from 0.212 kW/ha in 1971–72 to 0.075 kW/ha in 2021–22, whereas, the power available from tractors, power tillers, diesel engines and electric motors has increased from 0.02 to 1.932, 0.001 to 0.020, 0.053 to 0.368 and 0.041 to 0.568 kW/ha, respectively during the same period. This progression signifies India's gradual but consistent movement towards modern mechanized agriculture. However, mechanization levels remain uneven across operations. Tasks demanding high power and low precision such as tillage, transport, water pumping, milling, and threshing, are more mechanized. Mid-level mechanization is seen in operations like seeding, spraying, and intercultural work. But areas requiring high precision and lower power, like

transplanting, vegetable planting, and fruit harvesting, still lag behind.

Moreover, mechanization access is skewed by landholding patterns. Mechanical power is primarily utilized on large farms, whereas small and marginal farmers who own nearly 85% of operational holdings often cannot afford high-cost machines like tractors, laser levellers, and combine harvesters. The average landholding in India has declined significantly from 2.82 hectares in 1970–71 to 1.16 hectares in 2010–11. More recently, it further shrank from 1.08 hectares in 2016–17 to just 0.74 hectares in 2021–22, a 31% drop, further undermining the economic viability of individual machine ownership driven by factors such as rural-to-urban migration, low wages, aging farm workforce, and the seasonal nature of farm employment, which is expected to intensify in the coming years.

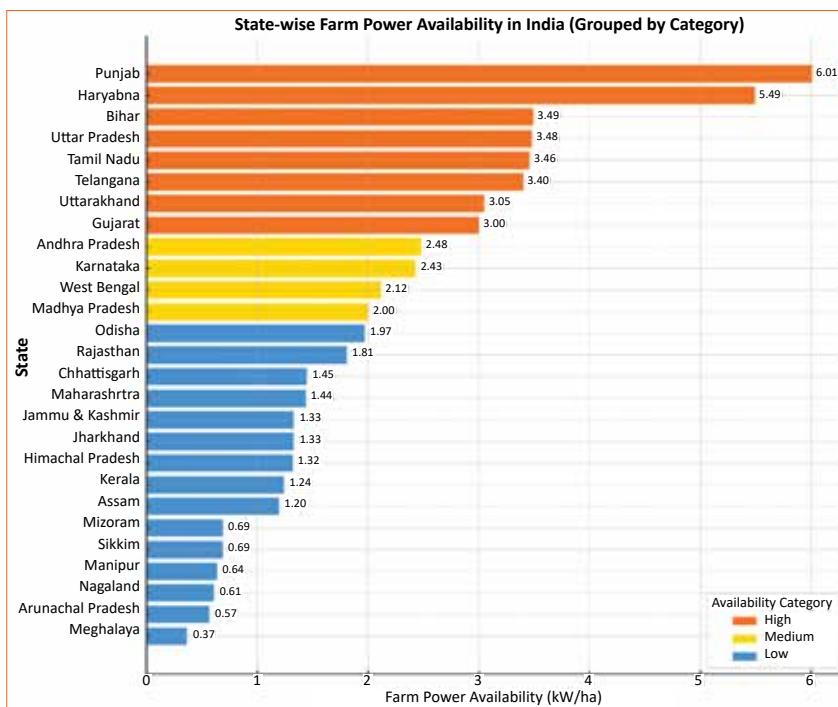
In such a scenario, mechanization is no longer optional, it is imperative. This is where custom hiring emerges as a game-changing solution. By enabling small and marginal farmers to rent equipment on a need-basis, either from better-off neighbours or dedicated Custom Hiring Centres (CHCs), custom hiring ensures access without the burden of ownership. It enhances the efficiency and utilization of machines, making their operation more economically viable. In essence, it democratizes technology, allowing all farmers, regardless of land size, to benefit from mechanization.

Among the many strategic interventions to transform Indian agriculture and realize the vision of “Viksit Bharat” (Developed India), custom hiring of farm machinery stands out for its inclusiveness, scalability, and transformative potential. With farm mechanization still at only 47% in India, compared to 70% in countries like China and Brazil, unlocking access to mechanization for smallholders is not merely a policy goal, it is a national necessity.

### The uneven landscape of mechanization in India

India has witnessed remarkable growth in agricultural production since the green revolution, significantly supported by increased use of inputs and mechanization. While this progress has boosted productivity, the spread of mechanization remains highly uneven, both regionally and across crop types. States like Punjab and Haryana have farm power availability upwards of 5 kW/ha, whereas in the north eastern states and hilly regions like Meghalaya, Nagal and, and Arunachal Pradesh, it hovers below 1 kW/ha.

This stark regional disparity reflects broader challenges in terrain, accessibility, and infrastructure. A similar divide exists across cropping systems. While cereal crops like wheat and rice have achieved



Variations in farm power availability among different states of India

(Source: Standing committee on agricultural, animal husbandry, and food processing, 2022–23, Research and development in farm mechanization for small and marginal farmers in the country; <https://sansad.in/getFile/lsscommittee/Agriculture>)







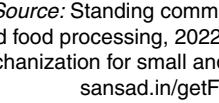
mechanization levels of 50–60%, horticultural crops, pulses, oilseeds, and rainfed farming systems remain largely untouched by modern machinery. The lack of suitable, crop-specific mechanized solutions, coupled with terrain-specific needs, has left these sectors under-mechanized and inefficient. These disparities are rooted in structural constraints like

- Small and fragmented landholdings, making individual ownership of high-cost machines increasingly uneconomical.
- Low capital availability and limited access to institutional credit, especially for small farm holders.
- Inadequate rural infrastructure, particularly in remote and hilly regions.
- Lack of technical skills to operate and maintain complex machinery.

Furthermore, tractors and combines, while useful, often go underutilized with average use below 600 hours annually, against an economic viability threshold of 1,000 hours. This not only leads to financial losses for owners but also restricts the broader adoption of machinery in rural communities. Addressing this unevenness requires targeted interventions such as promoting custom hiring services, supporting region-specific mechanization technologies, and expanding infrastructure and capacity building programmes to ensure that the benefits of mechanization reach every corner of Indian agriculture.

### Custom hiring: Empowering India's smallholder majority

In a country where over 82% of farmers operate on less than two hectares, access to farm machinery remains a persistent challenge. Custom hiring centres (CHCs) offer a practical, scalable, and inclusive solution

Crop	Mechanisation Level
 Wheat	69 %
 Rice	53 %
 Pulses	46 %
 Oilseed	41 %
 Cotton	39 %
 Sugarcane	36 %
 Sorghum	35 %

Crop-wise mechanization level of major crops in India

(Source: Standing committee on agricultural, animal husbandry, and food processing, 2022-23, Research and development in farm mechanization for small and marginal farmers in the country; <https://sansad.in/getFile/lssccommittee/Agriculture>)

by enabling small and marginal farmers to rent tractors, transplanters, harvesters, drones, and other machinery on a pay-per-use basis, thus bypassing the high cost of ownership. Already, over 63.5% of Indian farmers rely on rented machinery, reflecting both the pressing need and growing acceptance of this model. Custom hiring unlocks multiple benefits as it reduces the capital burden, improves machine utilization, lowers per-unit costs, and ensures timely field operations, a critical advantage in rainfed agriculture where every day post-monsoon matters. With only 53% of arable land under irrigation, completing sowing and harvesting within narrow windows can mean the difference between success and failure.

Modern agriculture is rapidly evolving, with innovations such as AI-powered diagnostics, GPS-guided sowing, drone spraying, and sensor-based irrigation defining a new era of precision farming. However, the benefits of these technologies will remain out of reach for smallholders unless made accessible through shared rental ecosystems. Research on farm mechanization reveals that it can increase productivity by up to 30% and reduce input costs by 20%. It also contributes to sustainability and inclusivity reducing drudgery, promoting women's participation, encouraging residue management, and ensuring precise application of water, seed, and agrochemicals. As India

works towards its net-zero emission target by 2070, climate-smart mechanization via custom hiring must become a central pillar of agricultural reform. This approach focuses on energy-efficient and low-emission technologies, precision farming tools for optimal resource use, and machinery that supports sustainable practices such as residue incorporation and conservation agriculture.

CHCs are also enabling mechanization in previously untouched areas like paddy transplantation, horticulture operations, and precision spraying especially through women-friendly, lightweight, and miniaturized equipment tailored to small and intercropped plots.

#### The policy push: A multi-scheme momentum

India's policy framework has progressively embraced custom hiring as a strategic enabler of equitable mechanization. Leading this push is the Sub-Mission on Agricultural Mechanization (SMAM), launched in 2014-15, which aims to increase farm power availability from 1.84 kW/ha (2013-14) to 4 kW/ha by 2030. The scheme provides up to 80% financial assistance to Farmers Producer Organizations (FPOs), cooperatives, and Panchayati Raj Institutions for setting up CHCs. Individual farmers receive subsidies of 40-50% for machine purchases. This has led to a 65% increase in farm power, reaching 3.04 kW/ha by 2022, and significantly broadened access to machinery through shared models.

Complementing this, the Rashtriya Krishi Vikas Yojana (RKVY) offers flexible, state-driven funding for CHCs and Farm Machinery Banks, encouraging cluster-based implementation for localized efficiency. The Promotion of Agricultural Mechanization for *In situ* Crop Residue Management scheme further addresses environmental concerns by supporting CHCs with 80% subsidy on equipment like Happy Seeder and Super Straw Management Systems, tackling stubble burning in north India and improving regional air quality. To promote mechanization in traditionally underserved regions, the Bringing Green Revolution to Eastern India (BGREI) programme initiated in 2010 by the Government of India provides 50% assistance for rice machinery, often deployed through CHCs to ensure timely planting and harvesting in low-irrigation zones. Digital integration is accelerating access. The Drone Didi Scheme (2023) plans to deploy 15,000 agricultural drones to Women Self-Help Groups (SHGs) by 2026, enabling custom services in precision spraying, field mapping, and crop monitoring. Similarly, the Mission for Integrated Development of Horticulture (MIDH) promotes horticulture-specific CHCs for mini-harvesters, fruit pruners, and cold-chain equipment through Centre-State cost-sharing (60:40).

To further streamline access to shared mechanization services, the Government of India has launched the FARMS (Farm Machinery Solutions) mobile application in 2023 which is a multi-language digital platform designed to empower farmers across the country. Developed under the aegis of the Department of Agriculture Cooperation and Farmers Welfare (DAC

and FW), Ministry of Agriculture and Farmers Welfare (MoA and FW), the app facilitates custom hiring services without requiring access to a computer system. The FARMS app connects users with Farm Machinery Banks (FMBs), CHCs and Hi-tech hubs established under various central schemes. It not only simplifies the process of renting machinery but also enables individual farmers to offer their own equipment for hire, allowing them to generate additional income while ensuring optimal utilization of available resources.

Several state governments have also developed innovative approaches to enhance the reach and impact of custom hiring services. Tamil Nadu and Maharashtra have introduced mobile CHCs to provide access to remote and underserved regions. Odisha and Madhya Pradesh have promoted SHG-led and youth-led CHCs, fostering rural employment and empowering women entrepreneurs. Additionally, the integration of digital booking platforms now enables real-time equipment rentals and service tracking, significantly improving transparency, operational efficiency, and ease of access for farmers.

#### Strategy for inclusive mechanization

To unlock the full potential of custom hiring and extend mechanization to every corner of India, a '5A approach' is essential.

- **Awareness:** Strengthen outreach via mobile apps, Krishi Vigyan Kendras (KVKs), and local demonstration programmes.
- **Availability:** Encourage domestic manufacturing of

compact, modular, and terrain-specific machines to reduce dependency on low-quality imports.

- **Accessibility:** Promote decentralized CHCs, mobile rental units, and digital platforms to ensure last-mile service delivery.
- **Affordability:** Introduce flexible rental models, affordable EMIs, and support financing for cooperatives and SHGs.
- **Ability:** Invest in farmer training for machine handling, drone operations, and digital data interpretation.

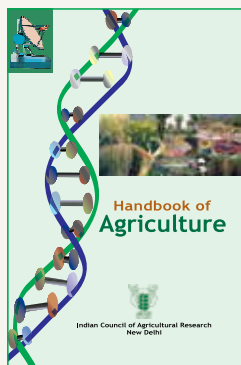
With over 2,800 agri-tech startups, India is well-positioned to build a robust, digital-first rental ecosystem. What's needed is policy coherence, regional customization, and strong public-private partnerships to scale the CHC model as a rural service revolution.

#### SUMMARY

Mechanization in India must go beyond technology i.e. it must be a tool for empowerment. Custom hiring democratizes access, turning expensive assets into shared resources and empowering smallholders with the tools they need to thrive. By building a smart, inclusive, and sustainable CHC network, India can bridge the mechanization gap, enhance agricultural resilience, and move decisively towards the vision of a "Viksit Bharat", where progress is not limited by land size and no farmer is left behind.

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