

Revolutionizing Indian Agriculture: Unleashing the Power of Secondary Farm Mechanization

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Abstract

Historically the foundation of the country's economy, the Indian agricultural industry is now facing a variety of issues including falling land availability, workforce shortages and more erratic weather patterns. Emphasizing secondary agriculture and farm mechanization has shown to be a game-changer to solve these concerns. Eighty-six percent of landowners are small and marginal farmers who typically find it difficult to buy expensive farm equipment and depend on tool rentals for their agricultural activities. Mechanization improves sustainability, lowers drudgery and brings efficiency. In secondary agriculture, mechanization is very important since it simplifies procedures, increases output and guarantees product quality. Various agricultural processes have been mechanized by government involvement and stakeholder initiatives. Still, there are problems like the small size of mechanical transplanting and harvesting and the absence of mechanical drying systems. Among the clear advantages of secondary farm mechanization are higher production, quality assurance, lower losses, income diversification, labour scarcity reduction and sustainability. Projects such as SMAM, food processing units, agri-startups and mandi modernization seek to encourage mechanization. Issues include environmental effect, affordability, knowledge and insufficient infrastructure call for attention. Providing subsidies, training and market connections depends on government, private sector participation and NGOs working together. All things considered, secondary farm mechanization has great power to change Indian agriculture, enhance living conditions and guarantee effective and sustainable food production.

Keywords: Farm Mechanization, Indian Agriculture, Secondary Farm Mechanization, Socio-Economic Impact, Technology

Introduction

Agriculture has traditionally been the backbone of India's economy, supporting millions of people. The industry has, therefore, struggled in several ways: shrinking land resources, workforce difficulties and erratic weather patterns. Recent years have seen increasing focus on secondary agriculture and its capacity to change the Indian farming scene. Using farm mechanization in secondary agriculture is becoming a game-changer that can solve many of these issues, hence guaranteeing more production, less drudgery and better sustainability. According to estimates, the average operational landholding size per person in the entire country is 1.16 ha, while small and marginal farmers (typically own less than 2 ha of land) account for 86% of all landholdings (Prasad et al., 2014). Farm mechanization is the practice of deploying agricultural machines on farms to complete individual agricultural processes more quickly. Many jobs once performed by manual labour or draft animals such as bullocks, oxen and horses have now been replaced by powered technology. Nonetheless, small and marginal farmers encounter difficulties in investing in expensive agricultural machinery and they typically rely on hiring farm implements to do agricultural work (Das et al., 2020). According to Kavya and Shobharani (2019), 54% of respondents want to change the conventional method in favour of a new methodology to improve the standard of living for farmers. 94% of respondents believe that modern mechanisation has increased farmers' agricultural yields. A substantial body of literature has emphasised how mechanisation, with its advantages of improved precision, timely operation, reduced drudgery and labour savings, helps with resource efficiency and increases factor productivity. Mechanisation is a key component of agricultural development and a driving force behind the transformation of rural areas or agricultural production in general. Traditional farms, which depend mostly on the output of farm labour, could not satisfy the evolving needs of the society for food and

nutritional security. Value addition to primary agricultural products, such as processing, packing and other post-harvest operations, defines secondary agriculture. This strategy not only prolongs the shelf life of goods but also improves their worth, hence creating various income-generating possibilities for farmers. From agro-processing to dairy, fisheries and horticulture, secondary agriculture has the potential to turn farmers into entrepreneurs.

The Role of Farm Mechanization

In secondary agriculture, farm mechanization is essential for process simplification and productivity increase. While preserving product quality, mechanized tools and equipment can greatly lower manual labour and time. For example, using machines to process, sort and package agricultural products guarantees consistent quality which is absolutely vital for reaching contemporary markets. Mechanical intervention in agricultural production has been slowly developing in the country since the early 1980s. The rate of farm machinery adoption has, nevertheless, significantly increased since the middle of 1990 as a result of the prohibition of the farm machinery standardisation committee as well as the liberalisation of import taxes for two-wheel tractors and small diesel engines. Due to its compatibility with our environment (small plots, for example) and socioeconomic situations (farmers' limited purchasing power, for example), the government has improved facilities for two-wheel tractors rather than four-wheel tractors. After 2009, when the government substantially expanded subsidies for agricultural mechanisation, farm mechanisation in the nation gained speed. The ministry, research institutions, extension agents, partners in development, manufacturers, traders, dealers and farmers all contributed to the momentum through their collective efforts (Islam, 2020). Due to the above-mentioned government intervention and that of other stakeholders, all agricultural processes, including tillage, irrigation, pesticide application and even threshing, are currently entirely mechanised. However, human labour is still used for other labour-intensive key cross-cultural procedures in rice farming, such as transplanting, fertiliser application, weeding, harvesting and winnowing. The investment required for a rice transplanter and a combine harvester exceeds the purchasing power of most agricultural households, resulting in a severely restricted scale of mechanized transplanting and harvesting in the country. Farmers in the country continue to sun-dry rice throughout the early rainy and wet seasons, despite considerable post-harvest losses attributed to inadequate access to mechanical drying facilities (Islam, 2020). For an example, the antagonist argued that the implementation of tractors would render laborers obsolete, whereas the protagonist maintained that it would promote intensive cropping and diversification, ultimately displacing labor while simultaneously augmenting employment opportunities (Dixit and Bhardwaj, 1990). The socio-economic element, characterized by two distinct sorts of ground realities, serves as an additional rationale for mechanization. The labor-saving technique will enhance agricultural output and efficiency, as noted by Murali and Balakrishnan (2012), in light of certain socio-economic challenges. The counterargument suggests that technology alleviates the arduous tasks that disproportionately burden women on farms (Kishtwaria and Rana, 2012).

Benefits of Secondary Farm Mechanization

- **Increased Productivity:** Mechanization speeds up and makes processing more efficient by lowering reliance on manual labour. Higher general production is supported by this improved efficiency.
- **Quality Assurance:** Mechanized systems produce consistent and uniform product quality, hence satisfying consumer expectations and industry standards.
- **Reduced Losses:** Modern machinery preserves the value of the produced produce by reducing losses during processing and handling.
- **Income Diversification:** Secondary agriculture provides farmers more sources of income. Mechanization enhances the potential of value-added products, which command better prices.
- **Labour Shortage Mitigation:** With the migration of rural youth to urban areas, there is a shortage of agricultural labour. Mechanization guarantees continuous post-harvest operations and closes this gap.

- **Sustainability:** Mechanization helps to sustainable agricultural operations by cutting waste, hence conserving resources and lowering environmental effect.

Successful Initiatives

- **Sub Mission on Agricultural Mechanization (SMAM):** It was introduced by the Government of India during 2014-15. The initiative seeks to 'reach the unreached' by ensuring accessibility and affordability of agricultural machinery for small and marginal farmers through the construction of Custom Hiring Centres (CHCs), thereby creating hubs for advanced and high-value farming equipment and machinery banks.
- **Food Processing Units:** The Pradhan Mantri Kisan SAMPADA Yojana (May, 2017) aims to establish food processing units near farms, minimizing transportation time and costs. It was conceived as an all-encompassing initiative aimed at establishing modern infrastructure with effective supply chain management from farm gate to retail outlet.
- **Agri-Startups:** A wave of agri-tech startups is bringing innovation to the sector. For instance, KhetiGaadi is an agritech startup located in Pune that operates an online platform. It is a comprehensive agricultural solution that guarantees complete servicing from start to finish. Many companies are developing mechanized equipment for tasks like sorting, grading and packaging.
- **Mandi Modernization:** Mechanized trading and storage solutions in traditional agricultural markets (mandis) are reducing post-harvest losses and ensuring fair pricing for farmers.

Challenges and the Way Forward

Although the advantages are clear, India's use of secondary farm mechanization presents several difficulties. The government, private sector participants and NGOs have to cooperate to offer subsidized equipment, training and better market connections thereby addressing these problems.

- **Awareness and Training:** To run and keep mechanical tools properly, farmers require knowledge and training.
- **Affordability:** Small-scale farmers may be discouraged by high equipment prices. Government subsidies or private sector assistance can help to reduce this obstacle.
- **Infrastructure:** Poor infrastructure, including storage and transportation systems, can impede the seamless movement of secondary agricultural goods.
- **Environmental Impact:** To avoid negative environmental effects, mechanization should be considered with sustainability in mind.

Conclusion

Overcoming the ongoing problems that have hampered the progress of Indian agriculture via secondary farm mechanization offers great potential. Efficient, technology-driven procedures are gradually replacing conventional techniques of human work and reliance on erratic variables. The move toward mechanization not only boosts production and quality control but also creates possibilities for environmental sustainability and economic diversification. Farmers that use contemporary equipment may improve their financial situation, cut losses and help to solve manpower shortages. However, challenges remain on the path to widespread adoption of secondary farm mechanization. Progress is nevertheless hampered by affordability, knowledge and infrastructure constraints. Providing inexpensive and accessible tools, as well as required training and support, requires government, business and non-governmental organizations working together. It is absolutely important to balance the advantages of mechanization with sustainable environmental practices if we are to guarantee that development is not obtained at the cost of our natural resources. Harnessing the power of secondary farm mechanization will surely be essential in crafting a profitable and sustainable future for India's agrarian economy as it travels toward agricultural transformation.

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