



# Market Trends, Challenges and Solutions of Agricultural Harvesting Machinery

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## Abstract

*The main focus of the study is to investigate the integration of Agriculture in \*Bharat\* with tools, machinery, understanding market trends as business Student to achieve sustainability Profitable objectives Specifically, the study aims to identify the benefits and challenges of using Agriculture Machinery, assess the impact of machinery method, benefits including costs, emissions, and operational efficiency, provide recommendations for optimizing the role of agriculture with solution, evaluate the perceptions and experiences of marketing and business professionals regarding the use of Agriculture machinery. It purely helps the business professionals and the stake-holders of \*Agriculture\* of how to utilize the scares, limited resources at a sustainable rate with steady improvement.*

## Keyword

*India/ Bharat, Agri-business, market trends, harvesting, technology, thresher machines, ethanol production, green hydrogen.*

## Introduction

In Indian/Bharat agriculture plays the very crucial role as it contributes Directly or Indirectly to the Indian Economy (GDP), In India agriculture governs Crop Diversity as India is known for its diverse Agre-climatic conditions, with the ability to grow any crop from any agriculture land due to its diverse Soil - richness which allow for the cultivation of a wide variety of crops|1|.

Land holdings in India or in modern Bharat are generally small and scattered, as per the survey about 1.08 hectares of land is owned by the farmers on an average. leading to challenges in achieving economies of scale and implementing modern farming techniques|2|. Irrigation in Indian agriculture Irrigation plays a crucial role due to the seasonal nature of rainfall. The government has invested in irrigation infrastructure such as dams, canals, and wells to improve water availability for agriculture. Apart from this in India Southern part of India faces more crises of irrigation as compare to Northern part of India. However, issues like water scarcity and inefficient water management persist in many parts of the country|3|. Employment is the primary source of income for about 58% of India's population, directly or indirectly. However, the contribution of agriculture to the GDP has been decreasing over the years (Decades) due to the growth of other sectors like services and manufacturing|4|. Indian agriculture faces several challenges, including diminishing land resources, soil degradation, water scarcity, climate change impacts, excessive use of urea- Fertilizers which occur disease, and lack of access to credit and modern technology. Addressing these challenges requires comprehensive strategies encompassing technological advancements, infrastructure development, policy reforms, and farmer education|5|. Export and Trade of India is a major exporter of agricultural since \*Centuries\* products such as rice, spices, fruits, and vegetables, now a days country also imports certain commodities to meet domestic demand and fill gaps in production|6|.

### Review of case studies

Sustainable Organic Farming in Sikkim: An Inclusive Perspective(2018) observation of how Sikkim becomes the self-sustained organic state of India with in the least time with in the Sikkim where almost 80% people still depend upon agriculture and allied activities. State has become the first organic state with adoption of 100% organic farming by preserving its rich natural resources with abundant flora and fauna, vibrant ecosystem and soil fertility with high organic matter content. As it has been the major exporter of fruits flowers spices and vegetable with all stakeholders and constraints in terms of infrastructure particularly irrigation, transportation and electricity, and financial and marketing constraints for higher output and income realization.

**Green hydrogen energy production:** current status and potential(March 2024). This study on green hydrogen helps in best technique of utilizing green and renewable sources, about green hydrogen, ways to reduce reliance on fossil fuels an many countries plan pathway towards net-zero emission by 2050.

Rice Thresher Machines in Handling System Alley Blow Rice in Post-Harvest (July 2020) from this study of Indonesia which county faced in 2017-2018 ant lacks in shift in the necessity to earning, threshing processes both in term of cost and labor.

Socio economic aspect of organic farming practices for improving farmer's income in some locations of Kerala, India(October 2019)this study helps in knowing the livelihood for most of the farmers but study was constrains to kerala by give the real picture of most of the farmers.

Solar-assisted gasification of agriculture residues for green hydrogen production (June 2023) this study combines boyh solar and green hydrogen production make it real gasification.

### Farmers and income of farmers

- A farmer is a person engaged in agriculture, raising living organisms for food or raw materials. The term usually applies to people who do some combination of raising field crops, orchards, vineyards, poultry, or other livestock..
- A farmer might own the farmland or might work as a laborer on land owned by others. In most developed economies, a "farmer" is usually a farm owner (landowner), while employees of the farm are known as farm workers (or farmhands). Over half a billion farmers are smallholders, most of whom are in developing countries and who economically support almost two billion people.

### Globally, women constitute more than 40% of agricultural employees.

The income and investment patterns of farmers in India are influenced by various factors such as crop yields, market prices, government policies, and access to resources which are-

### Income Sources

**Crop Yield:** The primary source of income for most farmers in India is crop cultivation. The income generated depends on factors like the type of crops grown, productivity per acre, and market prices.

**Livestock Farming:** Some farmers also derive income from livestock rearing, including dairy farming, poultry farming, and animal husbandry.

**Non-Farm Activities:** Many farmers engage in non-farm activities during the off-season or to supplement their agricultural income. This may include small-scale businesses, wage labor, or working in allied sectors.

### Government Support

The Indian government provides various subsidies, grants, and support schemes to farmers to encourage investment in agriculture. These include subsidies on fertilizers, seeds, machinery, and interest-free loans.

Mantri Fasal Bima Yojana (PMFBY), and Kisan Credit Card (KCC) aim to provide financial assistance, crop insurance, and credit facilities to farmers.

Machinery used by farmers In general now a days farmers are uses machinery like: harvesters, threshers, tractors, reapers, etc.

### Harvesters

It is a highly engineered machine with powerful parts equipped with advanced features such as GPS systems, yield monitoring technology etc. These features enhance efficiency and productivity while reducing labor requirements.

### Thresher Machines

Threshers that are suitable for the specific crops grown in your region, whether it be grains like wheat, rice, or pulses. Different crops may require different threshing mechanisms and adjustments.

### Tractors

Tractors now a days is more advanced and fuel efficient with sufficient horsepower and torque ratings to match the workload and implement requirements of your farm operations, whether it involves plowing, or any heavy-duty task. Now a days electric tractors are also introduced against the diesel- powered tractors.

### Objectives

To know the present market trends, challenges and solutions available in the field of agriculture business, and for related stake holders. To know about the real-life analysis from income of farmer the increase in income.

To know the impact of new policies of government in the field of ethanol production and green hydrogen as pure fuels.

### Harvesting and post harvesting of agriculture

Indian agriculture experience Vivid/Different type of weather season as Winter (December to February), Summer (March to May), Rainy (June to September), Autumn (October to November). India's agriculture is diverse in geography, crop, climate, cultivation Practices.

Post-harvest activities in agriculture are crucial steps that occur after crops have been harvested from the field, these steps includes "Cleaning and Sorting- Grading and Quality- Packaging- Storage- Processing and Value- Adding- Transportation and Distribution- Marketing and Sales- Waste Management".

### Ethanol Production & Green Hydrogen Use from Agricultural Waste

#### Ethanol Production:

The significant findings from the research I have done I came to the exploration of ethanol production from agricultural waste. Agricultural waste, such as crop residues, straw, husks, and stalks, can be converted into ethanol through various biochemical and thermochemical processes. This presents an opportunity to utilize agricultural residues effectively, reduce waste, and produce a renewable biofuel that can be used as a \*substitute for fossil fuels\*, &generating income for the farmers as farmers usually burn the waste because it costly of the farmers to overlay and under lay soil.

The research highlights the potential benefits of ethanol production from agricultural waste, including, Waste Utilization, Renewable Energy, Economic Opportunities etc.

#### Green Hydrogen

The use of tractors lead to cost reduction with alternative of fossil fuel as it turn out less greenhouse gases and low in carbon footprint with pollution.

#### As it benefits in the following ways:

**Clean Energy:** Hydrogen is a clean and renewable energy source that can help reduce greenhouse gas emissions and mitigate climate change. Hydrogen is as efficient as CNG of now a days technology, and as clean as electricity.

**Energy Efficiency:** Hydrogen fuel cells can offer high energy efficiency compared to traditional internal combustion engines.

Harvesters and tractors equipped with hydrogen fuel cell systems can potentially achieve higher fuel efficiency and longer operating ranges, enhancing productivity and reducing operational costs.

**Versatility:** Hydrogen can be produced from various renewable energy sources, including solar, wind, and biomass, biogas.

**Reduced Dependency on Fossil Fuels:** Adopting hydrogen-powered harvesters and tractors can help reduce dependency on fossil fuels, which are subject to price volatility and geopolitical risks. By transitioning to hydrogen-based energy systems, farmers can enhance energy security and resilience to external supply disruptions.

### Conclusion & Suggestions

The objective of this examination is, addressing pre/post-harvest losses, implementing sustainable agricultural practices using Machineries like thresher machines, leveraging technological innovations, etc. By adopting these strategies, India can progress towards improving food security, reducing economic losses, and ensuring the long-term sustainability of its agricultural sector. After going through the detail research about the topic that I have chosen, I would like to add some suggestions from my side so that these points can be undertaken by the relevant individual who is referring this report for any sorts of information to do their research. Below listed are some points of the suggestions that can be considered;

Government has to work more aggressively on building the infrastructure that support the charging of these EV's & hydrogen. **Providing the initial subsidies to boost the new sector.**

### Limitations

- This research is done with the motive for the Business professionals and other stake holders.
- The data and the references of the research is from the secondary data.
- Reference from the world and native country is taken, therefore it may change with the change in geography , demography, earning, need of that time.
- Data analysis is done from the secondary data available, like technology, machinery used, like threshers, tractors. Comparison of land is done with the secondary data available.

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