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Market Evolution and Strategic Development in India's Tractor Industry

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Abstract

Over the years, the Indian tractor industry has undergone profound changes, primarily due to the mechanisation of agriculture, advancements in technology, government policies, and shifts in the market. This paper focuses on the evolution of the Indian Tractor Market and the Strategic Development Programs of the manufacturers for maintaining the competitiveness in the market. This paper elaborates on industry growth, market segmentation and the key drivers of market growth such as mechanisation, rise in rural income, policy action and farm technology. The review also emphasises strategic measures, including product innovation, technology uptake, marketing approaches, expanding the dealer network and business models based on exporting. Further, it maps out the market challenges in the industry such as market competition, dependence on monsoons, supply chain disruptions, and emerging opportunities like electric tractors, precision agriculture, digital farming, sustainability, and export markets. The results suggest that ongoing innovation and strategic modifications will continue to be crucial to India's future role as a leader in the global tractor market.

Keywords; Indian tractor industry; Agricultural mechanisation; Market evolution; Strategic development; Tractor manufacturing.

INTRODUCTION

In India, agriculture is considered as a very important economic activity and it is responsible for the sustenance of rural livelihoods, food security, employment generation etc. With the ever growing time sensitivity of agricultural operations and the increased labour requirement, farm mechanisation has become a major factor that contributes to agricultural productivity and efficiency [1], [2]. Tractors are considered as backbone of mechanised agriculture among the agricultural machines as they perform various operations from land preparation to sowing, transportation, harvesting, powering agricultural machines etc. Tractors have been widely adopted, leading to a decrease in manual labor, a more efficient schedule for farm activities, and increased crop productivity, they are essential to modern farming [3].

India has emerged as the world's largest tractor market in terms of tractor sales per year and one of the major tractor manufacturing hubs in the world. The expanding industry has been aided by the mechanisation of farms, the Government's encouragement of agricultural development, greater availability of credit for farmers, and greater demand for efficient farming equipment. Indian manufacturers have also gained a foothold in the international market by exporting products, investing in technology, and having competitive manufacturing capabilities, which has helped the country's industries and agriculture to grow [4], [5].

Market evolution is the change of an industry over time in size of the market, customer demand, the competitive structure, product innovation, and technological advancement. Conversely, strategic development involves the long-term actions companies take to ensure their sustainable competitiveness by means of innovation, product diversification, marketing, distribution and business expansion [6].

The Indian tractor market's dynamics and the strategic moves by the manufacturers have to be understood to evaluate the competitiveness of the market and recognize future opportunities to sustain the growth [7]. This review thus analyzes the key drivers of the market evolution and the strategic activities which are still impacting the growth of India's tractor industry.

Evolution of the Indian Tractor Market

In the last 60 years the Indian tractor industry has witnessed a remarkable transformation, from a small import dependent industry to the largest tractor market by unit sale per annum in the world. The rapid growth in agricultural mechanisation, conducive government policies, technological improvements, and demand for efficient farm equipment are all contributing to this evolution. As farming practices have shifted towards higher productivity and commercial agriculture, tractor manufacturers have expanded their product portfolios, strengthened distribution networks, and increased export capabilities. All these advances have made the tractor industry a vital part of the agricultural economy of India and have contributed to agricultural productivity and industrial growth [8].

The history of industry development started in the 1960s with the beginning of national production with the participation of foreign manufacturers. However, policy changes, the localization of manufacturing and capital investment in the manufacturing infrastructure helped Indian companies decrease the reliance on imported tractors and build a robust indigenous tractor sector [9]. Present day, companies like Mahindra & Mahindra, TAFE, Escorts Kubota, Sonalika have made a significant presence in the domestic and international market by continuous development and manufacturing expansion of their product line.

This is reflected in the growth trends in the market, where demand for tractors is expected to continue to grow as farm mechanisation levels rise, more credit becomes available and government subsidy schemes are implemented, and agricultural income becomes higher [10].

India has been selling more than 900,000 tractors per year, and export volumes are also rising, and this is attributed to the competitiveness of tractor pricing and their quality of production. Now, Indian manufacturers are able to supply tractors to over 100 countries in Asia, Africa, Europe & Americas, thereby firmly establishing its position in the international agricultural machinery market.

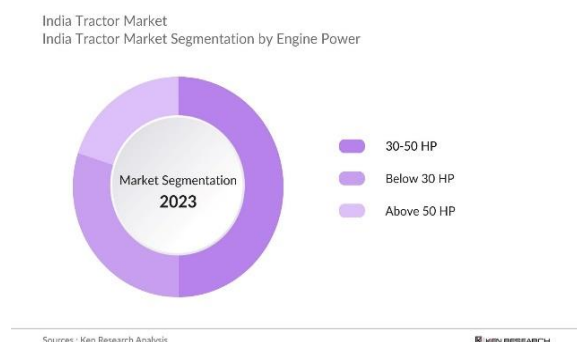
Indian tractor market is segmented based on the following factors: Horse power (HP), application and end user. Domestic demand is dominated by 30-50 HP as they meet the demands of medium sized farms and diversified farming activities [11].

There is an increasing trend of higher horsepower tractor usage for commercial farming and haulage operations, and the use of compact tractors is being made by horticulture, orchard and small landholders. The diversified product mix allows the manufacturers to cater for the different requirements of the farmers across the regions and ensure consistent growth in the market.

India Tractor Market Size (In USD Bn), 2018-2028



India Tractor Market Segmentation by Engine Power (in %), 2023



(a) Indian agriculture tractor market size;
(b) Indian agriculture tractor market segmentation by engine power

“Source - <https://www.kenresearch.com/industry-reports/india-tractor-market-industry>”

Table 1: Evolution of the Indian Tractor Market in India

Aspect	Key Features	Impact on the Indian Tractor Industry
Industry Evolution	Domestic tractor manufacturing began in the 1960s through collaborations with international companies. Progressive localisation of production reduced dependence on imports. Expansion of indigenous manufacturers such as Mahindra & Mahindra, TAFE, Escorts Kubota, and Sonalika. Adoption of advanced manufacturing technologies and continuous product development.	Established India as one of the world's leading tractor manufacturing countries with a strong domestic production base.
Market Growth Trends	Steady increase in demand due to agricultural mechanisation. Growth supported by government schemes, institutional finance, and rising rural incomes. Continuous improvement in manufacturing capacity and technological innovation. Increasing adoption of tractors for commercial farming and allied agricultural activities.	Sustained market expansion and improved agricultural productivity, making India the largest tractor market by annual sales.
Domestic Sales Trends	India consistently records annual tractor sales exceeding 900,000 units . Demand is primarily driven by northern, western, and central agricultural states. Seasonal fluctuations influenced by monsoon performance and crop prices. Availability of financing and subsidies encourages tractor purchases.	Strong domestic demand provides stability to manufacturers and supports long-term industry growth.
Export Trends	Indian manufacturers export tractors to more than 100 countries	Strengthens India's global competitiveness

	across Asia, Africa, Europe, and the Americas. Growth supported by competitive pricing, product reliability, and compliance with international standards. Increasing focus on expanding global dealer and distribution networks.	and diversifies revenue sources beyond the domestic market.
Market Segmentation	Segmented by horsepower (HP), application, and customer requirements. 30-50 HP tractors dominate the market due to suitability for medium-sized farms. Compact tractors are increasingly used in horticulture and orchards. Higher HP tractors are preferred for commercial farming, haulage, and heavy-duty applications.	Enables manufacturers to meet diverse farming needs and expand market coverage across different agricultural segments.

Major factors driving market evolution

Several factors have influenced the development of the Indian tractor industry, each of which has been linked to the economy, technology, and policy in some manner. The market has been influenced by increased demand for mechanised farming, the support of government programmes, the accessibility of agricultural products in the rural market and changes in farming practices. These factors have led to the greater use of tractors and have stimulated innovation, product diversification, and market penetration [12], [13].

- 1. Agricultural Mechanization:** The agricultural mechanization has been the biggest contributor to the growth of the tractor market in India. Labour shortages, higher production cost and requirement for prompt farm operation have pushed mechanisation/transomtion of tractors and other implements in an accelerated manner. Tractors have increased the efficiency of farm operations, decreased reliance on manual labour and improved productivity on farms, especially in areas of high agricultural intensity.
- 2. Government Initiatives:** The government policies have played a crucial role in favouring the demand for tractor through farm mechanisation promotion

policies, agricultural credit and subsidy assistance policies. Some schemes like the Sub-Mission on Agricultural Mechanization (SMAM) and the availability of easy institutional finance have helped the small and medium farmers invest in modern agricultural machinery and thus boosted the domestic tractor market.

3. **Rural Income Growth:** Better prices for crops, better use of farm diversification and better access to formal credit have enhanced farmers' purchasing power, with improved rural incomes. Sustained market growth is facilitated by higher disposable income encouraging the purchase of farm equipment such as tractors.
4. **Changing Farming Practices:** Indian agriculture is slowly moving towards commercial farming, precision agriculture and multi-cropping which demands efficient and reliable machinery. Technologically advanced fuel-efficient and multifunctional tractors that enhance productivity and lower operating costs are more and more popular among farmers. The evolving agriculture trends are still shaping the product innovation and strategic growth of the tractor industry.

Strategic Development of Tractor Manufacturers

The Indian tractor market has been rapidly evolving, which has forced the industry to continuously change their business strategies in order to be more competitive and meet the changing expectations of customers [14]. Innovation has become a key focus in the transformation of traditional manufacturing methodologies in leading companies, with an emphasis on product differentiation, technological improvement, customer-centric services, and global market expansion. The strategic initiatives have enhanced the industry's robustness and played a positive role in maintaining industry growth [15].

1. **Innovation and Product Development:** The Indian tractor market is experiencing a trend of product innovation as a competitive edge. Newer models of fuel-efficient tractors, ergonomic design, more powerful engines, and models specifically developed for horticulture, commercial farming, and small farms are being released by the manufacturers. Ongoing research and development (R&D) investment helps the companies to enhance the quality of the product, reduce their operational expenses, and cater to the farmer's taste.
2. **Technology Adoption:** The application of technology has revolutionized the manufacturing

of tractors and how they are operated. GPS guidance, telematics, precision farming, systems with the Internet of Things, and smart hydraulic controls are increasingly appearing in products developed by companies. These technologies bring operational efficiencies, optimal fuel use, and data-driven decision making for farm management which further adds value to the customer.

3. **Marketing and Distribution Strategies:** The companies have enhanced their market presence with a variety of marketing approaches, digital marketing, outreach marketing programs, demonstration programs and customized finance. Increasing distribution networks and using digital platforms has helped to enhance customer engagement and made products more accessible in established and emerging markets.
4. **Dealer Network and After-sales Service:** But a strong dealer network will remain a key strategic advantage for tractor companies. Businesses are constantly increasing their dealership presence in rural and semi-urban areas to ensure they have products available on time, maintenance services, spare parts and technical assistance. Good after-sales service contributes to customer satisfaction, customer loyalty, and repeat sales.
5. **Strategic Alliances and Exports:** Indian firms have been able to enhance product development and manufacturing capabilities through strategic partnerships with the global technology providers and international manufacturers. At the same time, export-oriented business models have helped Indian tractor manufacturers become present in 100 countries worldwide with the supply of tractors. The agricultural machinery industry is competitive in pricing, international standards, and product quality, making India a key exporter of agricultural machinery and further strengthening the global competitiveness of the tractor industry in India.

Market Challenges and Emerging Opportunities

The Indian tractor industry is a dynamic industry that has a number of external influencing factors for its market performance, including economic, environmental and technological factors. Despite the ongoing growth of the sector, driven by higher mechanisation and policy support, manufacturers have to overcome a number of barriers to market competition, agricultural uncertainty and disruptions to their supply chains. Meanwhile, new technologies and

sustainable agriculture offer potential for long-term success and competitiveness on the international market.

Market Challenges

Tractors are a competitive market with many domestic and international manufacturers competing, resulting in high price sensitivity and margins. Competitive pricing is a crucial factor in sales decision making, but so is the innovation of products achieved by companies over time. The demand for tractors also is very close to the performance of monsoons, agricultural production and farmers income. Farm income fluctuations caused by weak monsoons or lower crop prices may cause fluctuations in domestic sales and machinery purchase. Also, manufacturers are continuing to face supply chain issues due to increasing costs of raw materials, semiconductor shortages, logistics issues, and price fluctuations in steel. All of these are driving up production costs, impacting delivery timelines, and making stock management more difficult, leading companies to implement more flexible and flexible sourcing and manufacturing practices [16].

Emerging Opportunities

In spite of these challenges, there are several opportunities that are emerging in the industry that are expected to benefit the industry. The rise of electric tractors is a promising development in the field of sustainable agriculture, as it can help to lower the amount of fuel used and greenhouse gas emissions produced. Precision agriculture, digital farming, and GPS-controlled machines, combined with IoT-based resource monitoring and smart farm management systems, are enhancing the efficiency of farm operations and resource use. More and more, sustainability programs are important measures for improving competitiveness, such as cleaner production methods and energy-efficient machines. Moreover, the increasing demand for agricultural machinery in the global market has presented a huge opportunity to Indian manufacturers to innovate, improve quality and penetrate the international market through the export of their innovative machinery [17].

LITERATURE REVIEW

(Fairuz et al., 2026) [18] Global greenhouse gas emissions are mostly caused by agriculture. "Agricultural Electric Vehicles (AEVs)" are becoming more and more popular due to their potential for adoption and environmental advantages as the sector decarbonizes. Nevertheless, simulations or modified "ICET (Internal Combustion Engine Tractor) data" were used in over half of

the research. Few used cradle-to-cradle system limits or included specific battery lifespan effects like toxicity, aging, and recycling. End-of-life stages and endpoint signs were frequently left out. When compared to internal combustion engine (ICE) systems, battery electric vehicles (BEVs) showed a 72% reduced total environmental impact (single score). There is still much to learn about other sorts of AEVs. Interestingly, "Social Life Cycle Assessment (S-LCA)" was not employed in any study. High upfront expenses, poor infrastructure, and performance constraints are identified as the main obstacles in adoption studies. Multi-criteria interdisciplinary approaches that balance environmental, economic, and social priorities are needed to accelerate the uptake of AEVs. These approaches include "targeted policies, financial incentives, investments in rural infrastructure, farmer training, clear regulations, and public-private partnerships for locally tailored solutions". Future studies should apply cradle-to-cradle modeling, incorporate real-world data, employ mixed techniques, and cover a wider range of vehicle types. Adoption that is socially acceptable and context-specific requires the integration of S-LCA and culturally sensitive frameworks.

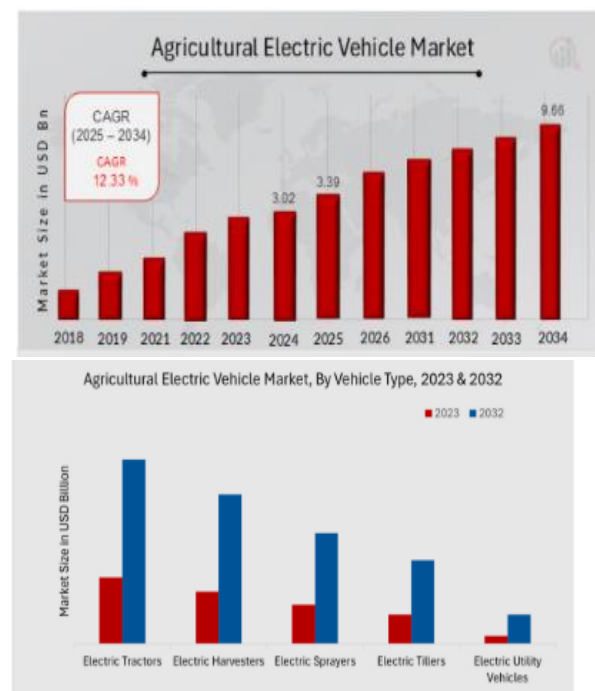


Figure 2: AEVs market trends from 2018 to 2034, along with the breakdown of the AEVs market by vehicle type for the years 2023 and 2032 [18]

(Herranz-matey & Ruiz-garcia, 2025) [19] looks at how agricultural tractor performance changed between 1989 and 2024, emphasizing environmental sustainability,

productivity, and efficiency in the face of growing tractor size and portfolio complexity. In order to replace conventional industry measurements like power production and fuel consumption with user-centric metrics like area productivity and fuel consumption per hectare, a new "virtual reference implement" is presented. The study models the evolution of important performance characteristics using linear and polynomial regressions using data from the OECD tractor testing procedures. The results demonstrate a 1.65-fold gain in productivity, a 1.06-fold improvement in fuel economy, and significant reductions in emissions, with particulate matter falling by 11.6 and NMHC + NO_x falling by 8.6. These results demonstrate how technical developments, such as the virtual reference implement, may improve agricultural tractor performance and environmental sustainability.

(Kundu et al., 2024) [20] A thorough and cooperative effort across several sectors would be necessary for the effective deployment of e-tractors in India. India can establish itself as a leader in sustainable agricultural mechanization by tackling major obstacles through initiatives for early market development, creative business models, scalable pilot programs, and equitable financing frameworks. In addition to increasing productivity, this joint strategy will support national and international decarbonization objectives, guaranteeing Indian agriculture a more promising and sustainable future. Additionally, the Indian agricultural ecosystem's quick adoption of e-tractors would promote early market growth, allowing local producers to solidify their position as the world's leading producers of e-tractors and open up export markets.

(Wolok et al., 2023) [21] Determine Indonesia's manufacturing industry's plan to boost economic growth. In this study, the descriptive qualitative method was employed. 20.27% of the national economy of ASEAN comes from the manufacturing industry. In this study, a qualitative method was employed. Secondary data from literature reviews or literary studies is the source of information used. In order to expedite Indonesia's economic development, the manufacturing industry strategy is being implemented as part of an industrial strategy 4.0, which aims to establish the Digital Industry Center of Indonesia. The adoption of an Industrial 4.0 strategy, or a platform for the implementation of the Indonesia Digital Industry Center 4.0 (PIDC 4.0), embodies the manufacturing industry's aim to boost Indonesia's economic growth. Secondary data was gathered from publications, journals, newspapers, and "the Central Statistical Agency (BPS)". The manufacturing industry's

GDP growth rate happened between 2017 and 2021, according to the required statistics.

(Bhattarai et al., 2017) [22] examines how tractor use has changed in India over the last few decades and adds a panel model analysis utilizing variables related to the rise in tractor density at the state level. In contrast to "the United States and Japan", India has seen growth in tractor use at comparatively low pay rates, with a sizable portion of the labor force still employed in the agricultural sector. Tractor density have increased as a result of significant local manufacturing expansion. The average amount of agricultural holdings, cropping intensity, and per capita income all had a favorable impact on tractor density in India's 14 main states between 1982 and 2012. Even in low-wage areas of India, tractor intensity increased quickly, suggesting that the dissemination of agricultural machinery and tractors among smallholding farmers in India may not have been influenced by comparatively lower labor rates.

(Lal & Singh, 2016) [23] Customers' conduct in a particular market determines whether a business succeeds or fails. Therefore, the consumer is at the center of all marketing initiatives. Understanding and forecasting consumer behavior in both urban and rural settings is always challenging. The remaining population resides in urban areas, with 68.84% of the total population living in 6,40,867 villages. With 2.4% of the world's land area, 4% of its water resources, and almost 15% of its cattle, India has to increase output to feed its growing people and animals. The function of agriculture now begins, and it is dependent on farmers and agricultural automation. Tractor penetration in agriculture is essential. In addition to being employed for non-agricultural uses, tractors are used for production, transportation, building, and the production of power. With 68.86% of its inhabitants living in rural areas and 48.16% of them employed, India is an agricultural nation. Thus, the Indian economy is directly impacted by agriculture. Over 740 million people use the Indian rural market, and each year, almost one million additional people join the market. As a result, its potential is quite significant and profitable for marketers.

(Prasad Mohanty & Augustin, 2014) [24] comprehend and offer a practical framework that enables the writers to recognize the external and internal factors as well as the spirit of the modern era that contributed to the group's transformation. The group's evolutionary development and strategic trajectory explaining traits in its various phases have been interpreted using the "Greiner curve" model. The organization transitioned from a proprietorship model to a

professionally managed group with great success. It is discovered that innovation-led cooperation has enabled tremendous growth. The firm is increasingly planning its innovation initiatives around the creation of solutions to particular problems. The article had to rely solely on secondary sources because original data for the first several years was unavailable. The organization occasionally employs a variety of tactics that have real-world effects on the Indian economy. The group has encountered numerous difficulties, but the challenge-led collaboration-driven approach is a new kind of innovation process that stands in contrast to other business strategy methods. It brings together stakeholders with a variety of interests, expertise, and perspectives and offers a sharper focus for managerial and technical issues. This research, which is regarded as a symbolic portrayal of Indian economic history, is the first attempt in India to track the development of strategic interventions inside the framework of a significant business organization. The article is useful for both academic and management purposes.

(N. Sharma & Khattri, 2013)[25] The tractor industry is crucial to India's agricultural economy, which is an agriculture-based sector. The manufacturing process for "the Indian tractor industry" began in 1961–1962, yet despite its youth, it has grown to be the biggest market in the world. The industry currently has thirteen significant participants, with "Mahindra & Mahindra" at the top. The government's efforts to support agriculture and the agricultural machinery sector have contributed to the industry's recent strong sales growth, both domestically and internationally. This report provides an overview of "the tractor industry in India", examines the present tractor sales situation, and projects sales for 2012–13, including sales projections for 13 distinct states. The statistical program MINITAB was used for the investigation. For forecasting, the best ARIMA models have been created and applied. According to the results, industry sales volume is expected to increase by 30.4% in 2012–13 compared to 2011–12.

CONCLUSION

The Indian tractor industry has grown from a small domestic manufacturing industry to become the world's largest tractor market with a rising trend in mechanisation of agriculture, policies that are favourable to the industry, technological innovations and increasing demand in the rural sector. The market characteristics of evolution have been marked by continuous growth of domestic market, increase of export activities and diversification of the product lines to serve the diverse needs of Indian agriculture.

As a result of the market dynamics, manufacturers have taken strategic steps to continuously innovate their products, integrate digital technology, expand dealer networks, focus on marketing to customers, and partner with overseas manufacturers. Yet, all these successes have not resulted in an end of problems faced by the industry, such as heavy competition, agriculture income relying on monsoon, and uncertainty in the supply chain. Meanwhile, opportunities related to global market expansion, precision agriculture, digital farming, sustainable manufacturing, and electric tractors are anticipated to drive the next step in the evolution of the industry. In conclusion, the competitiveness of the Indian tractor sector in the long-term will rely on its capacity to adopt technological innovation, sustainable business models, and adapt to changing agricultural and market demands.

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