
INDUSTRY OVERVIEW

The information and statistics set out in this section and other sections of this Document were extracted from the Frost & Sullivan Report prepared by Frost & Sullivan, which was commissioned by us, and from various official government publications and other publicly available publications. We engaged Frost & Sullivan to prepare the Frost & Sullivan Report, an independent industry report, in connection with the [REDACTED]. The information from official government sources has not been independently verified by us, the Sole Sponsor, the [REDACTED] or any of their respective directors and advisers, or any other persons or parties involved in the [REDACTED], and no representation is given as to its accuracy.

SOURCE AND RELIABILITY OF INFORMATION

We engaged Frost & Sullivan, an independent market research consultant, to conduct an analysis of, and to prepare a report on, the global and China's intelligent agricultural machinery and smart agriculture industry for use in this Document (the "**Frost & Sullivan Report**"), which was commissioned by us for a fee of RMB450,000. In compiling and preparing the Frost & Sullivan Report, Frost & Sullivan adopted the following assumptions: (i) the global social, economic and political conditions currently discussed will remain stable during the forecast period; (ii) government policies on the global and China's intelligent agricultural machinery and smart agriculture market will remain consistent during the forecast period; and (iii) the global and China's intelligent agricultural machinery and smart agriculture market will be driven by the factors which are stated in this report in the forecast period. Except as otherwise noted, all of the data and forecasts contained in this section are derived from the Frost & Sullivan Report. The Frost & Sullivan Report has been prepared by Frost & Sullivan independently without any influence from us or other interested parties.

Frost & Sullivan is an independent global consulting firm founded in 1961 in New York and its services include, among others, industry consulting, market strategic consulting and corporate training. Frost & Sullivan conducted (i) primary research, which involved discussing the status of the industry with certain leading industry participants, and interviews with industry experts on a best-efforts basis to collect information in aiding in-depth analysis; and (ii) secondary research, which involved reviewing company reports, independent research reports and data based on its own research database.

ANALYSIS OF GLOBAL AND CHINA'S INTELLIGENT AGRICULTURAL MACHINERY AND SMART AGRICULTURE INDUSTRY

Overview of Global and China's Agriculture Industry

The level of development of the global agricultural industry is uneven, food security still faces multiple challenges. It is necessary to continuously invest in technology in order to improve agricultural productivity. Intelligent agricultural machinery and smart agriculture have become the key solutions.

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According to statistics, the total value of global agricultural output grew from RMB25.6 trillion in 2020 to RMB32.8 trillion in 2024, among which the developed countries contributed 67% of the incremental output value, and the problem of uneven development is prominent. At present, the global agricultural industry is facing the triple pressure of population growth, frequent occurrence of extreme weather events and tightening resource constraints, and food security is at stake with 920 million people around the world still in a state of serious food insecurity. The practice of Europe and the United States has shown that technological empowerment is the key to breaking the deadlock: the level of automation of agricultural machinery in the European Union has reached 72%, and the coverage of smart agricultural technology in the United States has exceeded 80%. There is still a significant gap between the level of agricultural machinery intelligence in China and that in Europe and the United States. For example, in the European and U.S. markets, the intelligent driving level of agricultural machinery has reached Level 3. In contrast, Level 1 intelligent driving has achieved large-scale commercial application in China, while Level 2 is still in the promotion stage. In the future, the smart agricultural technology system based on intelligent agricultural machinery will be the key path to meet the challenge of food security.

China is currently entering a new phase of development from traditional agriculture to modern agriculture, with agricultural productivity and operation model facing profound changes and upgrades.

As a country with a population of 1.4 billion, China faces a serious imbalance between food demand and farmland resources. The huge population base has induced rigid food demand. Although the self-sufficiency rates for staple food such as wheat, corn and rice have exceeded 95%, as the room for expansion is constrained by the existing scale of farmland of 1.9 billion mu, the dependency rates of imported oil crops and fodder such as soybeans remained high at 80%. In 2024, the imbalance caused by such structural shortages was prominent, as China’s grain production reached 710 million tonnes and total grain import reached 160 million tonnes. As the level of agricultural modernization in China still lags behind as compared to its industrialization, how to address the problem of “food security” has become a national strategic priority.

China’s agricultural development faces acute challenges such as labor shortages and aging population. With the continuous decline in the number of agricultural workforce, the problem of “who to farm” is becoming increasingly prominent. From 2020 to 2024, China’s total agricultural output grew from RMB7.2 trillion to RMB9.1 trillion, representing a CAGR of 6.3%. During the same period, China’s urbanization rate rose from 63.9% to 67.0%, and is expected to reach 70% by 2030, the migration of young adult labor from rural areas to urban areas is accelerating. Coupled with the acceleration of aging population (with the proportion of people aged 65 and above in rural areas reached 18.7% in 2024), the number of agricultural workforce has plummeted from 180 million to 160 million. It is expected that the number of agricultural workforce will drop to 140 million by 2030 and may plummet to merely 30 million by 2050.

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China’s agricultural operation model still lags significantly behind that of developed countries in Europe and America. The development of large-scale farming entities, specialized agricultural service organizations, and specialized equipment and technologies remains relatively backward, and the development of scientific farming is in a bottleneck. In the developed countries in Europe and America, over 70% of farming is conducted on a large scale, supported by agricultural machinery that is characterized by large-scale, high-end and intelligent control systems. Precision farming and other smart agriculture technologies have been widely implemented at scale. At present, China’s agriculture remains predominated by traditional smallholder, with large-scale operations exceeding 100 mu accounting for less than 40%. The agricultural machinery is mainly small to medium-sized, the penetration of high-end, intelligent agricultural machinery remains low and smart agricultural technologies are still immature.

The imbalance between food security and the development of agricultural productivity in turn drove an adjustment of the scalable field management and customer structure, accelerating transformation of traditional agriculture towards modern agriculture. Firstly, the scalable field management is accelerating. The area of land transfer in China increased from 460 million mu in 2016 to 580 million mu in 2024. The government continues to promote the construction of high-standard farmland and driving contiguous land transfer through integration of village collectives. Land transfer has now entered a stage of dual-driven development, characterized by “scale expansion and quality improvement”. Secondly, the customer structure is undergoing in-depth adjustments. Family farms, planting cooperatives and other new types of business entities and agricultural service organizations are developing rapidly, and the scaling and intensification of agricultural operations are accelerating. The new generation of agricultural workforce possesses relatively higher levels of education and professional skills, and their acceptance and application capabilities for intelligent technologies have significantly improved, thereby promoted the transformation and upgrade towards intelligent and smart agricultural production.

Driven by scalable field management, structural shifts in the customer base and the pursuit of high-quality development of agricultural production, intelligent agricultural machinery and smart farming are poised to seize a historic window of opportunity.

Traditional agricultural machinery equipment is transforming and upgrading towards large-scale, high-end, intelligent and green operation to promptly address the problem of “who to farm”. In terms of tractors, the proportion of large-scale tractors with over 100 horsepower and 200 horsepower will continue to increase, with chassis technology evolving from mechanical shift towards electronic chassis represented by power shift and continuously variable transmission (CVT). The level of complete-vehicle intelligence is constantly improving, and intelligent driving technology is being rapidly popularized. In terms of harvesters, there is an increasing focus on reducing losses and improving efficiency during harvesting, while the demand for intelligence level and driving comfort continues to grow. Large harvesters equipped with grain monitoring, grain loss monitoring and intelligent control functions for harvesting are becoming a development trend. In terms of agricultural implements, the demand for large-scale and high-end machinery such as high-speed precision

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planter, large smart sprayers, large high-density square balers and large batch dryers is increasing, with accelerated development of coordinated control between the implements and tractors. In the future, during the expedited advancement of comprehensive green transformation of the agricultural industry, new energy agricultural machinery such as new energy tractors, new energy harvesters and various types of electrified agricultural implements will enter a period of rapid development.

China’s smart agriculture is accelerating its development towards integrated technical applications, which will become the core driving force for breaking through the bottlenecks of industry development and addressing the “how to farm scientifically”. The solution for challenges faced by China’s agriculture such as ageing population, prolonged excessive use of fertilizers and pesticides and deteriorating level of soil organic matter and hence achieving sustainable development will be strenuously develop smart agriculture based on technologies such as navigation and intelligent driving, environment perception, the Internet of Things, big data and AI, so as to propel the transformation of agricultural production from “experience-based” to “data-driven”. Currently, China’s smart agriculture is in a transition period from pilot demonstrations to large-scale application in certain regions. The integration of China’s digital technology and modern agriculture has begun to bear fruits. In the future, smart agriculture technologies such as AI, intelligent driving, precise operations and remote sensing monitoring will be applied at a faster pace, and the collection, sharing and application of agricultural data will be further deepened. The next decade will be the “golden development period” for smart agriculture.

Definition and Classification of Agricultural Machinery

Agricultural machinery refers to a wide range of mechanical equipment used in agricultural production and the primary processing of agricultural products. It encompasses various stages of agricultural operations, including field preparing, planting, field management, harvesting, straw handling and grain drying. The major categories of agricultural machinery include tractors, harvesting machines and other agricultural implements.

Intelligent agricultural machinery integrates modern information technologies such as artificial intelligence, remote communication systems, big data, cloud computing, sensors and automatic control with agricultural machinery, equipment and technologies, so as to achieve a new form of agricultural machinery system characterized by automated, precise and intelligent agricultural production processes. Its core lies in empowering traditional agricultural implements with environmental perception, data analysis and decision-making and execution capabilities through technology, enabling them to automatically or assist them in completing agricultural operations such as field preparing, planting, fertilization, crop protection, harvesting and transportation. Compared with conventional agricultural machinery, intelligent agricultural machinery significantly enhances agricultural production efficiency, reduces resources consumption and lowers labour costs, making it a key equipment for advancing smart agriculture development and a key symbol of agricultural modernization.

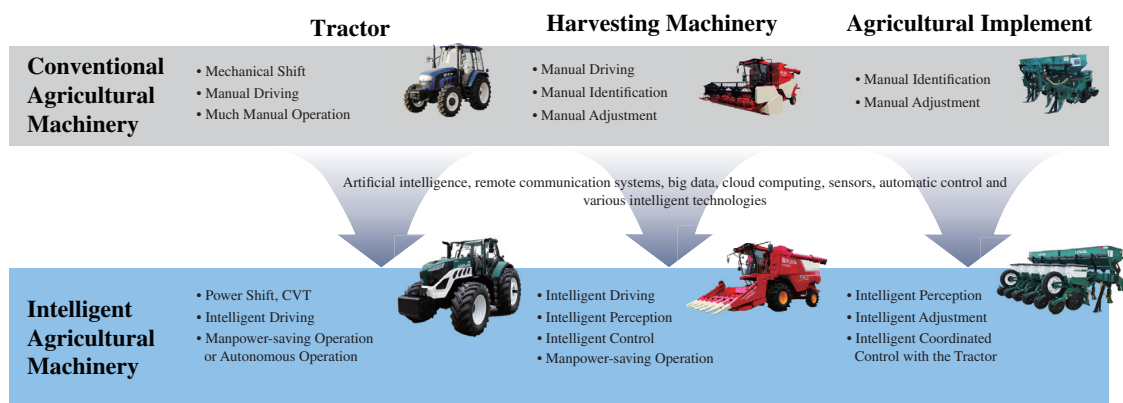
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Intelligent tractors are built upon high-end drive-by-wire chassis platforms (including technologies such as power shift and continuously variable transmission (CVT)), enabling an upgrade from “manual transmission” to “automatic transmission.” On this basis, they are equipped with a range of intelligent modules including electro-hydraulic suspension systems, ISOBUS technology, remote communication systems, intelligent perception systems (typically capable of integrating and analyzing real-time operational and environmental data collected from sensors, cameras and radars installed on agricultural machinery), and intelligent driving systems to achieve intelligent control of both mobility and farming activities. Intelligent tractors significantly reduce users’ operation time and fatigue in the field, substantially cut down manual labor in processes such as tillage and seeding — in some cases even replacing manual operation entirely — thereby greatly improving operational efficiency and quality, and effectively enhancing users’ overall economic returns.

Intelligent harvesting machinery is based on an integrated hydraulic or electro-hydraulic control walking system, and is typically equipped with several intelligent modules such as electro-hydraulic control system, remote communication system, intelligent perception system, intelligent driving system or precision operation system, enabling intelligent control over locomotion and harvesting activities. Such machinery improves harvesting efficiency and quality, reduces losses, effectively alleviates operator workload in complex and demanding field operations, and provides more precise and scientific decision-making support for agricultural production, thereby improving overall agricultural production economic benefits.

Intelligent agricultural implements generally refer to agricultural implements equipped with functions such as operation monitoring, intelligent control systems and ISOBUS technology.

Definition and Classification of Intelligent Agricultural Machinery



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Analysis of Agricultural Machinery Market

Market Size of Agricultural Machinery

Agricultural Machinery Market Size Analysis

The agricultural machinery market primarily includes segments of tractors, harvesting machinery, and agricultural implements. These categories serve different functions across various agricultural operations. Due to differences in application scenarios, technical complexity, and economic considerations, the level of intelligent development varies among various types of agricultural machinery. In 2024, the total global sales revenue of agricultural machinery reached approximately RMB1.5 trillion, while the total sales revenue of agricultural machinery in China was approximately RMB300 billion.

The following market size analysis of the agricultural machinery and intelligent agricultural machinery, as well as the comparative analysis of enterprises, primarily reflects the operating conditions of the key enterprises included in the statistics of the China Association of Agricultural Machinery Manufacturers.

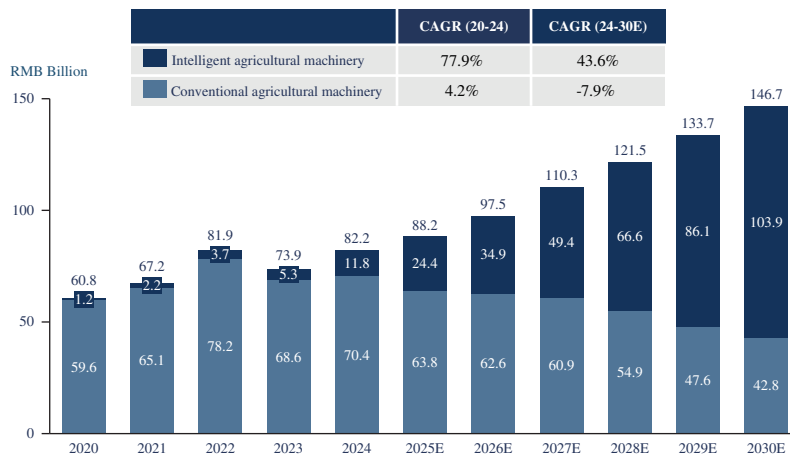
Intelligent Agricultural Machinery Market Size Analysis

China's intelligent agricultural machinery market is currently at an early stage of development. In terms of sales volume in 2024, the penetration rate of intelligent agricultural machinery in the overall agricultural equipment market in China was approximately 7.2%. The sales revenue of intelligent agricultural machinery in China reached approximately RMB11.8 billion in 2024. Driven by developed markets such as Europe and America, the global intelligent agricultural machinery market achieved a degree of intelligence of approximately 31.6% in 2024 based on sales volume. This indicates significant growth potential for China's intelligent agricultural machinery market.

With the continuous improvement of supportive policies, rapid advancements in technology, and the increasing competitiveness of leading enterprises of China's intelligent agricultural machinery industry, China's intelligent agricultural machinery market is expected to enter a phase of great-leap-forward development after 2025. The market size is projected to reach approximately RMB103.9 billion by 2030, representing a CAGR of approximately 43.6% between 2024 and 2030. By 2030, the development of China's intelligent agricultural machinery sector is expected to reach the global level, with a degree of intelligence of 33.1%.

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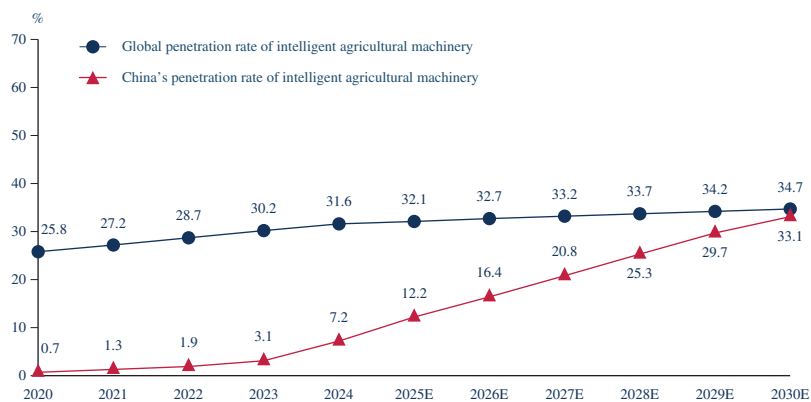
Market Size of Agricultural Machinery and Intelligent Agricultural Machinery (in terms of sales revenue), China, 2020-2030E



Note: The market size of agricultural machinery in China, as shown in the charts, refers to the sales value of key enterprises included in the statistics of the China Association of Agricultural Machinery Manufacturers.

Source: China Association of Agricultural Machinery Manufacturers, Frost & Sullivan

Penetration Rate of Intelligent Agricultural Machinery in the Overall Agricultural Machinery Market (in terms of sales volume), Global and China, 2020–2030E



Source: Frost & Sullivan

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Analysis of Competitive Landscape of Global and China's Agricultural Machinery Industry

Competitive Landscape of the Agricultural Machinery Market

Leading global players in the agricultural machinery and intelligent agricultural machinery sectors include traditional industry giants such as John Deere, CNH, AGCO Corporation, Kubota, and CLAAS. The leading players in China's agricultural machinery and intelligent agricultural machinery market mainly include domestic leaders such as Weichai Lovol and international players such as John Deere. Compared with foreign brands, domestic leaders benefit from localization advantages, enabling them to capture a larger market share in China's market.

In terms of global agricultural machinery sales revenue in 2024, Weichai Lovol ranked seventh, accounting for a market share of around 1.2%.

In terms of agricultural machinery sales revenue in China in 2024, the top five manufacturers accounted for a combined market share of 54.5%. Weichai Lovol ranked first with sales revenue of RMB17.4 billion and a market share of around 21.2%.

Ranking and Market Share of Agricultural Machinery Market (in terms of sales revenue), China, 2024

Rank	Company Name	Sales Revenue (RMB billion)	Market Share (%)
1	The Company	17.4	21.2%
2	Company A	11.9	14.5%
3	Company B	10.2	12.3%
4	Company C	3.0	3.7%
5	Company D	2.3	2.8%
	Others	37.4	45.5%
	Total	82.2	100.0%

Note: This ranking includes key enterprises included in the statistics of recognized by the China Association of Agricultural Machinery Manufacturers.

Company A is a company located in Henan, China, primarily engaging in sales of tractors, harvesting machinery, diesel engines, and core components. It was established in 1955 and its major subsidiary listed on both the Hong Kong and Shanghai Stock Exchanges.

Company B is a company located in Jiangsu, China, primarily engaging in sales of harvesting machinery, tractors, and related agricultural machinery. It was established in 2003 and is not listed.

Company C is a company located in Jiangsu, China, primarily engaging in sales of harvesting machinery, transplanter, tractors, and other agricultural machinery. It was established in 1998 and is owned by Japanese enterprises.

Company D is a company located in Tianjin, China, primarily engaging in sales of agricultural machinery. It was established in 2005 and is owned by an American agricultural machinery company.

Source: Company reports, Frost & Sullivan

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Competitive Landscape of the Intelligent Agricultural Machinery

Based on intelligent agricultural machinery sales revenue in China in 2024, the top three manufacturers accounted for 70.5% of the total market share. Weichai Lovol ranked first with sales revenue of RMB5.4 billion, representing a market share of approximately 46.0%.

Ranking and Market Share of Intelligent Agricultural Machinery (in terms of sales revenue), China, 2024

Rank	Company Name	Sales Revenue (RMB billion)	Market Share (%)
1	The Company	5.4	46.0%
2	Company D	1.8	15.2%
3	Company C	1.1	9.3%
	Others	3.5	29.5%
	Total	11.8	100.0%

Source: Frost & Sullivan

Analysis of China’s Tractor Industry

Market Size of Tractor

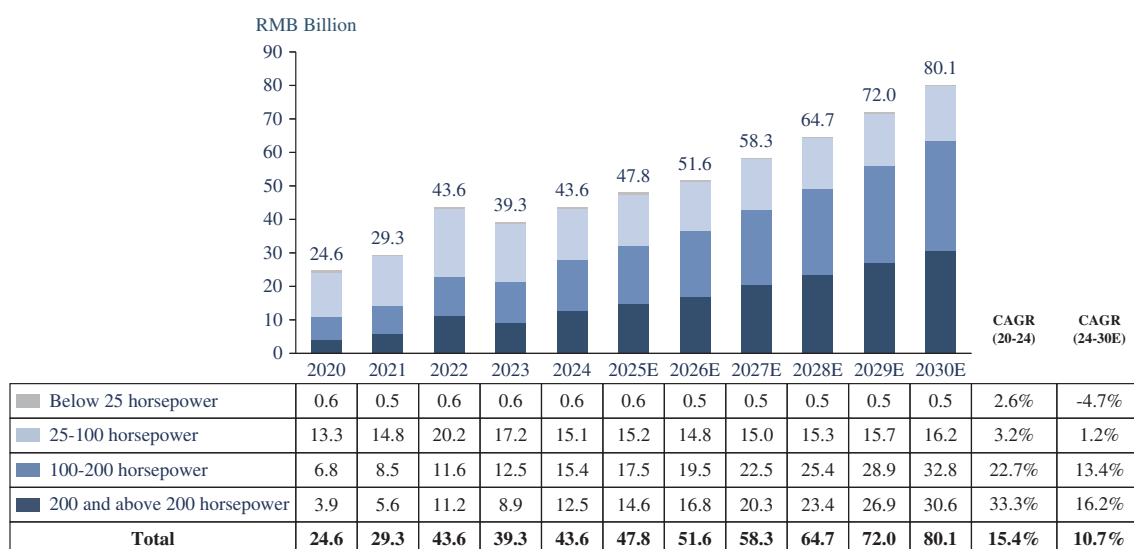
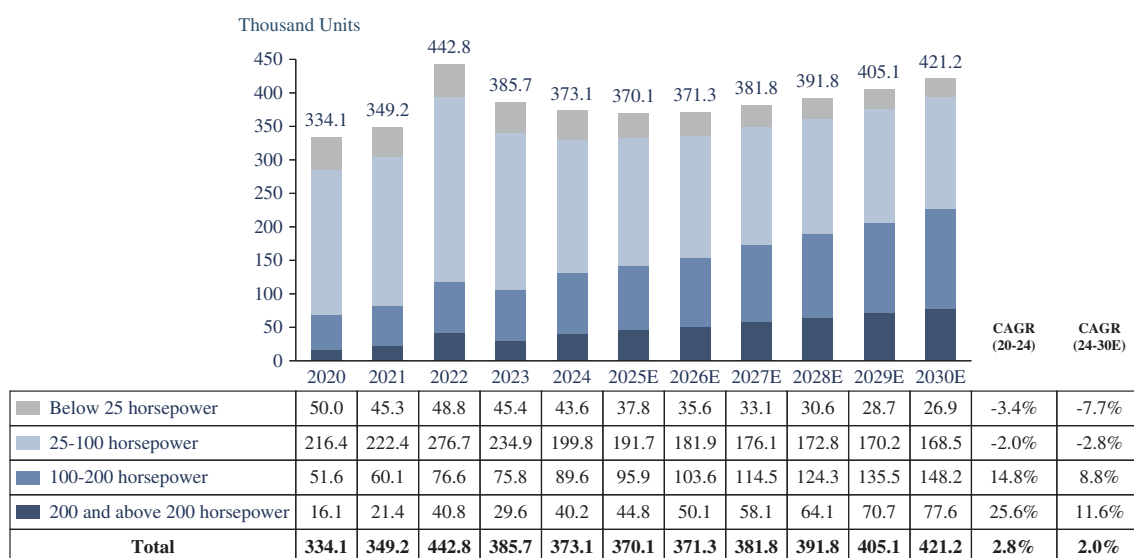
Tractor is among the most essential type of agricultural machinery. Typically composed of modules such as power systems, transmission systems, hydraulic systems, electronic systems, chassis, and work devices, tractors are used for towing and driving various agricultural implements. Their core function is to provide power for agricultural production and they are widely applied in dryland farming, paddy fields, orchards, and recreational agriculture.

With the advancement of high-standard farmland development, the acceleration of scalable field management, and the rollout of the “Premium Machinery, Premium Subsidies” policy, new types of agricultural operators and socialized service providers are rapidly emerging. This is fueling an upgrade in customer demand and propelling China’s tractor industry toward higher-end, larger-scale, smarter, and greener development. From a zero base to global competition, China’s tractor industry has evolved from “nonexistent” to “excellent,” driven by technological breakthroughs and policy support, becoming a key pillar of agricultural modernization. The industry is also exhibiting several key characteristics: First, the product mix is steadily improving, with growing demand for high-end and smart models; Second, the industrial chain is becoming more complete, driven by stronger collaboration across upstream and downstream players; Third, the level of internationalization continues to rise, with steady growth in export activities. China’s tractor industry is advancing toward a modernized system characterized by cutting-edge technology, high-quality products, and comprehensive services.

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Tractors are typically classified by horsepower into three categories: large tractors (≥ 100 horsepower), medium tractors (25–100 horsepower), and small tractors (< 25 horsepower). Affected by various factors such as targeted government subsidies, accelerated agricultural scale-up, and product technology upgrades, the domestic tractor industry is currently showing a significant high-horsepower development trend. While the proportion of sales of medium and small tractors has declined in recent years, large tractors have consistently demonstrated robust growth in both unit sales and revenue. In particular, sales of high-horsepower tractors with 200 horsepower or more reached 40.2 thousand units in 2024, representing a CAGR of 25.6% from 2020 to 2024. This momentum is expected to continue, with projected CAGR of 11.6% from 2024 to 2030, further accelerating the industry's transition toward higher horsepower and intelligent tractor solutions in China.

Tractor Sales Volume and Revenue by Horsepower Segment in China (2020–2030E)



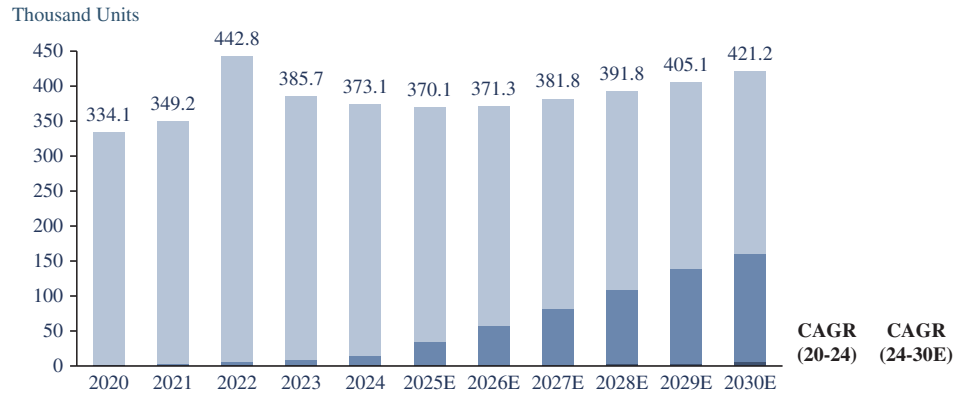
Source: China Association of Agricultural Machinery Manufacturers, Frost & Sullivan

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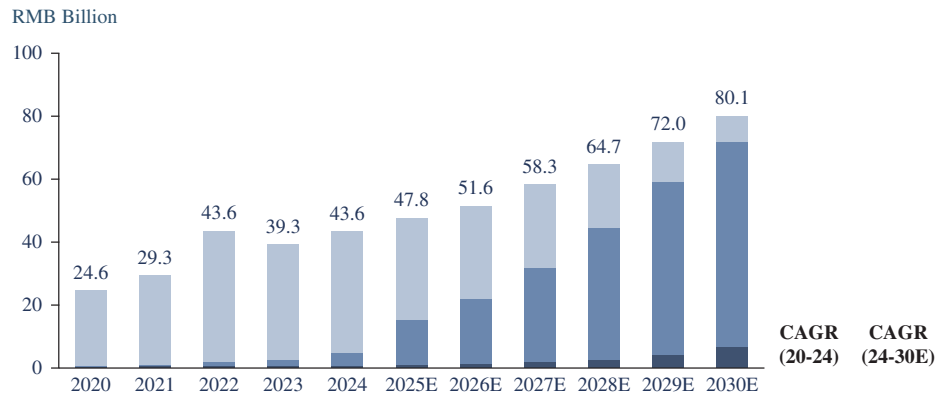
In terms of transmission technologies, tractors can be classified into mechanical shift, power shift, and Continuous Variable Transmission (CVT). Mechanical shift in tractors is comparable to manual transmission in automobiles, requiring frequent clutch-operated gear shifts. It is cost-effective but labor-intensive. Power shift, similar to semi-automatic automotive systems, allows rapid, clutch-free gear shifting via levers or buttons, thereby improving operational efficiency. CVT, comparable to fully automatic automotive systems, enables seamless speed adjustment without discrete gears, offering higher comfort, fuel efficiency, and precision, though associated with the highest technological complexity. Currently, mainstream tractors sold in China use mechanical shift technology, which rely heavily on frequently stepping on the mechanical clutch for gear changes during use. This leads to increased operator fatigue, limited operational efficiency, and higher wear on the clutch due to improper handling, thereby affecting the machine's service life. Power shift technology replaces traditional mechanical manipulation with an electro-hydraulic control system, simplifying gear changes to push-button control. This allows fast gear transitions while maintaining uninterrupted power output. Coordinated operation between wet clutch packs and electronic control units enables operators to shift gears under complex conditions within 0.15 to 0.45 seconds, significantly improving operational efficiency and equipment reliability. CVT technology, utilizing power coupling, supports seamless speed regulation 0-40 km/h. Meanwhile, the intelligent matching of the engine's optimal working curve ensures that the tractor consistently operates in its peak power output and fuel efficiency zone. Compared to power shift models, CVT tractors can reduce fuel consumption by 15% to 20% in deep field preparing and precision seeding scenarios while eliminating gear-shift-induced quality fluctuations to improve driving comfort. In 2024, tractor sales in China reached 373.1 thousand units, with total sales revenue of approximately RMB43.6 billion, the majority of which were mechanical shift models. In recent years, domestic brands represented by Weichai Lovol have successfully achieved breakthroughs in both power shift and CVT technologies, accelerating their adoption across the domestic market. Power shift tractor sales are projected to grow from approximately 13.8 thousand units in 2024 to approximately 155.8 thousand units by 2030, with a CAGR of approximately 49.8%, reaching a sales amount of approximately RMB65.0 billion by 2030. CVT tractor sales are expected to grow from less than 1.0 thousand units in 2024 to approximately 4.5 thousand units by 2030, with a CAGR of approximately 44.1%, and a sales amount of approximately RMB6.6 billion by 2030, laying a solid foundation for the continued development of intelligent tractor technologies in China.

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Tractor Sales Volume and Sales Revenue (by technology type), China, 2020-2030E



	2020	2021	2022	2023	2024	2025E	2026E	2027E	2028E	2029E	2030E	CAGR (20-24)	CAGR (24-30E)
Mechanical Shift	332.5	346.0	437.0	377.2	358.8	325.6	311.5	299.5	283.1	266.5	260.9	1.9%	-5.2%
Power Shift	1.3	2.8	5.3	8.1	13.8	43.8	58.9	81.1	107.1	135.9	155.8	79.3%	49.8%
CVT	0.3	0.4	0.5	0.4	0.5	0.7	0.9	1.2	1.6	2.7	4.5	10.6%	44.1%
Total	334.1	349.2	442.8	385.7	373.1	370.1	371.3	381.8	391.8	405.1	421.2	2.8%	2.0%



	2020	2021	2022	2023	2024	2025E	2026E	2027E	2028E	2029E	2030E	CAGR (20-24)	CAGR (24-30E)
Mechanical Shift	24.0	28.3	41.8	36.6	38.8	32.7	29.8	26.5	20.2	13.0	8.5	12.8%	-22.4%
Power Shift	0.3	0.6	1.3	2.2	4.1	14.2	20.6	30.1	42.1	55.0	65.0	97.2%	58.2%
CVT	0.3	0.4	0.5	0.5	0.6	0.9	1.2	1.7	2.3	3.9	6.6	17.2%	48.2%
Total	24.6	29.3	43.6	39.3	43.6	47.8	51.6	58.3	64.7	72.0	80.1	15.4%	10.7%

Source: China Association of Agricultural Machinery Manufacturers, Frost & Sullivan

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Intelligent Tractor Market Analysis

Intelligent tractors include power-shift and CVT models and generally equipped with advanced intelligent perception systems, electro-hydraulic control systems, ISOBUS technology, remote communication systems, enabling intelligent driving.

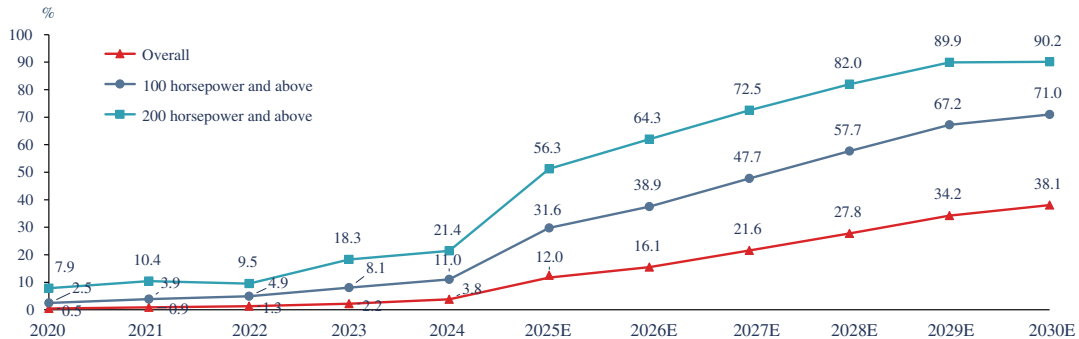
Autonomous driving is a key technology for intelligent tractor development. Compared to traditional tractors, autonomous tractors offer advantages in economic efficiency, operational safety, and productivity. They can effectively address issues such as rural labor shortages, labor aging, and production-related safety risks. Depending on the level of intelligence, intelligent tractors can achieving a leap from basic assisted navigation to full-scenario autonomous operation.

Currently, the development of intelligent tractors in China remains in the early stages, with a market penetration rate of approximately 3.8% within the tractor segment. According to the Implementation Opinions on Agricultural Machinery Purchase and Application Subsidies for (2024-2026) (《2024-2026年農機購置與應用補貼實施意見》), the maximum subsidy between intelligent tractors and traditional tractors above 200 horsepower is RMB39,100. This represents a significant intensification of policy support compared to the 2023 subsidy of merely RMB4,000, demonstrating a substantial increase in preferential national policy focus towards intelligent agricultural machinery. Furthermore, provincial governments are authorized to enhance subsidy amounts for key local machinery. The maximum subsidy rate has been raised to 35% in 2024 from previous 30%. Concurrently, subsidies for technologically outdated machinery are being reduced. For instance, Liaoning Province Agricultural Machinery Purchase and Application Subsidy Implementation Plan (2024-2026) (《2024-2026年遼寧省農機購置與應用補貼實施方案》) specifies that within the province, the maximum subsidy between intelligent tractors and traditional tractors above 200 horsepower reaches RMB52,700. This increase, along with growing policy incentives for power shift tractors and a series of intelligent agricultural machinery promotion policies, coupled with continuous technological innovation by domestic manufacturers, is expected to catalyze explosive growth in intelligent tractors starting in 2025. By 2030, the penetration rate of intelligent tractors in China's tractor market is expected to reach approximately 38.1%.

The development of intelligent tractors is closely related to the trend of increasing horsepower in tractors. The vast majority of intelligent tractors are high-horsepower tractors with 100 horsepower and above. It is projected that by 2030, the penetration rate of intelligent tractors among tractors of 100 horsepower and above will reach approximately 71.0%, and among tractors of 200 horsepower and above, the penetration rate will reach approximately 90.2%.

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Penetration Rate of Intelligent Tractors in the Tractor Market (in terms of sales volume), China, 2020-2030E



Source: Frost & Sullivan

Tractor Industry Ranking Analysis

At present, the concentration of the tractor industry in China is relatively high. The tractor industry is characterized by high barriers in terms of understanding of agricultural application scenarios, customers and brands, services, industrial chain resources, talents and technologies. Large enterprises enjoy significant advantages in high-end intelligent tractor R&D, manufacturing, sales, and after-sales services of high-end intelligent tractors, making it difficult for small and medium-sized enterprises to compete.

In terms of tractor sales volume in 2024, the top five manufacturers accounted for 66.4% of the market. Weichai Lovol ranked first with sales of 84.5 thousand units, achieving a market share of around 22.6%.

Ranking and Market Share of Tractors (in terms of sales volume), China, 2024

Rank	Company Name	Sales Volume (thousand units)	Market Share (%)
1	The Company	84.5	22.6%
2	Company A	74.3	19.9%
3	Company F	46.6	12.5%
4	Company G	21.7	5.8%
5	Company B	20.6	5.5%
	Others	125.5	33.6%
	Total	373.1	100.0%

Note: Company F is a company located in Jiangsu, China, primarily engaging in sales of tractors, agricultural implements, and supporting equipment. It was established in 1952 and it is not listed. Company G is a company located in Jiangsu, China, primarily engaging in sales of tractors, harvesting machinery, diesel engines, and generator sets. It was established in 2003 and it is not listed.

Source: China Association of Agricultural Machinery Manufacturers, Frost & Sullivan

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In comparison, China’s high-end intelligent tractor segment is more concentrated. Intelligent tractors are primarily composed of power shift and CVT models. Due to their higher technological complexity, greater R&D difficulty, and higher production costs, only a limited number of domestic enterprises with strong technological and financial capabilities are able to produce and promote these models effectively. Moreover, brand awareness plays a more decisive role in this high-end segment, with users tending to prefer well-known brands during the purchasing process.

In terms of intelligent tractor sales volume in 2024, the top three manufacturers accounted for 82.1% of the market. Weichai Lovol ranked first with sales of 7.5 thousand units, representing a market share of around 52.7%, and maintains a leading position in terms of intelligent technology adoption.

Ranking and Market Share of Intelligent Tractors (in terms of sales volume), China, 2024

Rank	Company Name	Sales Volume (thousand units)	Market Share (%)
1	The Company	7.5	52.7%
2	Company D	2.2	15.4%
3	Company C	2.0	14.0%
	Others	2.6	17.9%
	Total	14.3	100.0%

Source: Frost & Sullivan

Analysis of China’s Harvesting Machinery Market

Harvesting Machinery Market Size

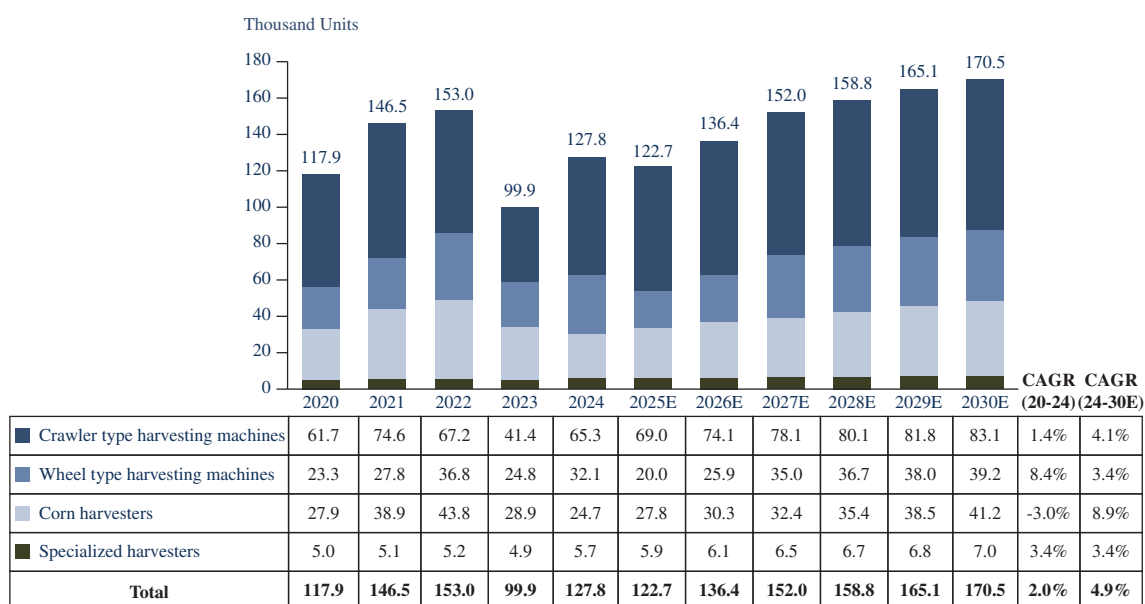
Harvesting machinery refers to agricultural machinery used to collect plant structures such as stems, fruits, seeds, or roots. Based on the target crop and technological characteristics, harvesting machinery can be categorized into single-operation machines and multi-operation combine harvesters. Single-operation machines such as harvesters and pickers perform only one task, while multi-operation combine harvesters such as grain combine harvesters and corn combine harvesters can complete multiple processes once.

Currently, domestic harvesting machinery technology is undergoing a transition toward enhanced precision, intelligence, efficiency, and large-scale. China’s national agricultural modernization strategy is driving the R&D of high-end harvesting machinery, with subsidy increasingly favoring large, smart models. From initial imitation to market expansion and technological iteration, China’s harvesting machinery industry has developed into a complete system covering multiple crops and diverse application scenarios. In the future, the industry will continue to focus on intelligence and large-scale, providing sustained support for agricultural modernization and the national food security strategy.

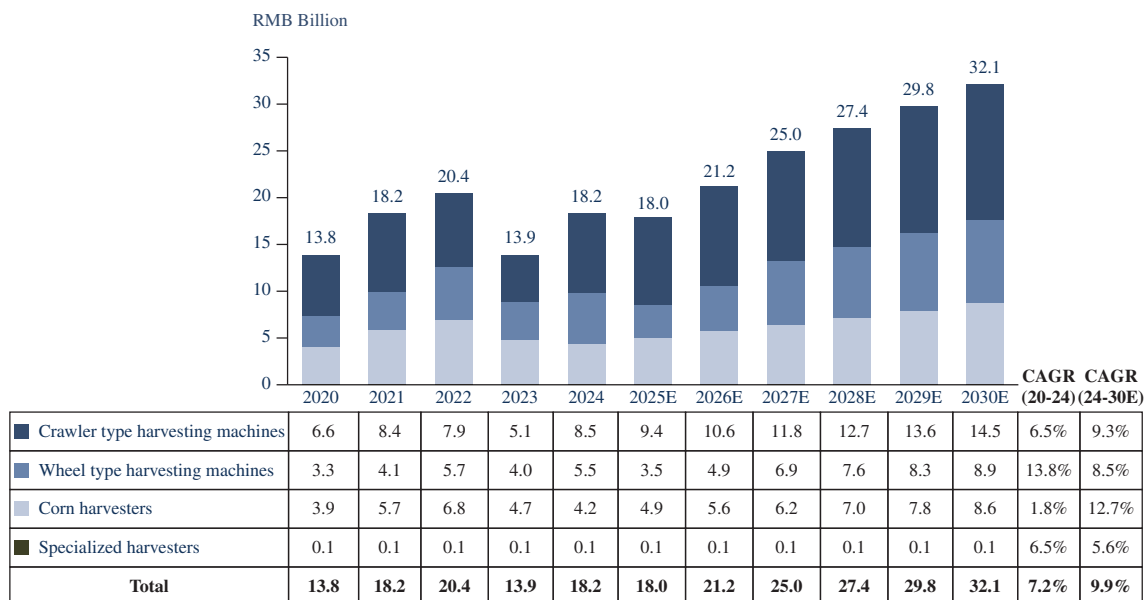
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Based on crop types, harvesting machinery can be classified into machinery for grains (such as wheat, rice, corn and soy beans), forage crops (e.g., green fodder, pasture grass, etc.), root crops (such as potatoes, peanuts and sugar beets), and fruits and vegetables. Among these, other harvesters for economic crops, such as peanut harvester and forage harvester, are collectively classified as specialized harvesters. Among all harvesting machinery, wheel type harvesting machines, crawler type harvesting machines, and corn harvesters represent the dominant product categories in China. In 2024, the sales volume of crawler type harvesting machine, wheel type harvesting machine, and corn harvesters in China were 65.3 thousand units, 32.1 thousand units, and 24.7 thousand units, respectively, with sales revenue of RMB8.5 billion, RMB5.5 billion, and RMB4.2 billion, respectively. The significant decrease in sales volume and sales revenue of harvesting machinery in China in 2023 was mainly caused by advance purchases made by users of harvesting machinery in 2022 to mitigate risks associated with the upgrade of China's agricultural vehicle emission standards from National III to National IV Emission Standard, which took effect starting December 2022. Looking ahead, these three types of harvesting machinery are expected to maintain steady growth, with sales volume reaching 83.1 thousand units, 39.2 thousand units, and 41.2 thousand units, by 2030, and sales revenue of RMB14.5 billion, RMB8.9 billion, and RMB8.6 billion, respectively.

**Sales Volume and Sales Revenue of Harvesting Machinery
(by crop type), China, 2020-2030E**



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Note: The market size for harvesting machinery in China, as shown in the chart, refers to the sales revenue of key enterprises included in the statistics of the China Association of Agricultural Machinery Manufacturers. Specialized harvesters include other harvesters for economic crops, such as peanut harvester and forage harvester.

Source: China Association of Agricultural Machinery Manufacturers, Frost & Sullivan

Intelligent Harvesting Machinery Market Analysis

Intelligent harvesting machinery generally refers to harvesting machinery equipped with advanced intelligent perception, electro-hydraulic control, precision operation and remote communication systems, with intelligent driving available.

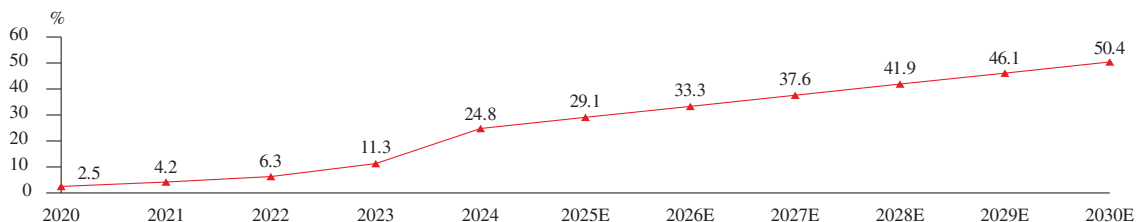
The intelligence level of intelligent harvesting machinery is primarily reflected in the precision monitoring, automated control, and intelligent regulation of harvesting operations. Intelligent harvesting technologies, including satellite positioning, yield detection, task detection, path planning, and decision-making control enabling the automatic identification and tracking of crops, and allowing precise control of the operational range and depth of harvest machinery, which improve both harvesting efficiency and quality.

Currently, China’s intelligent harvesting machinery remains in the early stages of development. The overall penetration rate of intelligent harvesting machines in the harvesting machines market is approximately 24.8%. Similarly, the most recent Implementation Guidelines for Agricultural Machinery Purchase and Application Subsidies (2024-2026) (《2024-2026年農機購置與應用補貼實施意見》) clearly states a “premium machine, premium subsidy” (“優機優補”) policy for harvesting machinery. For example, the subsidy eligibility threshold for grain harvesters has been raised from a feeding rate of over 7 kg/s to over 12 kg/s, with the maximum subsidy amount increased to RMB68,000. The refinement of subsidy

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policies is expected to further accelerate the development of China's intelligent harvesting machinery industry. The penetration rate of intelligent harvesting machines is projected to reach 29.1% in 2025 and further increase to approximately 50.4% by 2030.

Penetration Rate of Intelligent Harvesting Machinery in the Harvesting Machinery Market (in terms of sales volume), China, 2020-2030E



Source: Frost & Sullivan

Harvesting Machinery Market Ranking Analysis

At present, China's agricultural harvesting machinery industry demonstrates a high level of market concentration. Harvesting machines require highly crop-specific technical capabilities. For example, harvesting machinery for rice, wheat, corn, and other crops differ significantly in key components such as threshing mechanisms, header design, and cleaning systems. These differences require long-term, targeted technological accumulation, enabling well-capitalized and technically capable large enterprises to maintain a stable market presence. Furthermore, harvesting operations are highly seasonal, and the cost of equipment downtime due to failure is substantial, making it difficult for small and medium-sized enterprises to remain competitive. These factors, combined with national subsidy policies that favor high-performance models, are accelerating the consolidation of resources toward leading enterprises.

In terms of the sales volume of wheel type harvesting machines in 2024, the top 5 manufacturers collectively accounted for 84.8% of the market share. Weichai Lovol ranked first with a sales volume of 17.2 thousand units, holding a market share of approximately 53.5%.

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Wheel Type Harvesting Machine Market Ranking and Market Share (by sales volume), China, 2024

Ranking	Company Name	Sales Volume (thousand units)	Market Share (%)
1	The Company	17.2	53.5%
2	Company L	6.0	18.7%
3	Company B	2.2	6.8%
4	Company A	1.0	3.2%
5	Company O	0.8	2.6%
	Others	4.9	15.2%
	Total	32.1	100.0%

Note: Company L is a company located in Anhui, China, primarily engaging in sales of corn harvesters, grain harvesters, and tractors. It was established in 2011 and is a subsidiary of a comprehensive machinery company.

Company O is a company located in Shandong, China, primarily engaging in sales of harvesting machinery, and tractors. It was established in 2014 and is owned by a German agricultural machinery company.

Source: China Association of Agricultural Machinery Manufacturers, Frost & Sullivan

In terms of the sales volume of corn harvester in 2024, the top 5 manufacturers collectively accounted for 72.6% of the market share. Weichai Lovol ranked first with a sales volume of 5.3 thousand units, holding a market share of approximately 21.5%.

Corn Harvester Market Ranking and Market Share (by sales volume), China, 2024

Ranking	Company Name	Sales Volume (thousand units)	Market Share (%)
1	The Company	5.3	21.5%
2	Company H	5.3	21.3%
3	Company I	3.2	12.9%
4	Company J	2.1	8.6%
5	Company K	2.1	8.3%
	Others	6.8	27.4%
	Total	24.7	100.0%

Note: Company H is a company located in Hebei, China, primarily engaging in sales of corn harvesters and related agricultural machinery. It was established in 2009 and it is not listed.

Company I is a company located in Shandong, China, primarily engaging in sales of corn harvesters, and wheat harvesters. It was established in 1995 and it is not listed.

Company J is a company located in Shandong, China, primarily engaging in sales of harvesting machinery, tractors, and agricultural equipment. It was established in 1997 and it is not listed.

Company K is a company located in Shandong, China, primarily engaging in sales of harvesting machinery, and related agricultural equipment. It was established in 2011 and it is not listed.

Source: China Association of Agricultural Machinery Manufacturers, Frost & Sullivan

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In terms of the sales volume of crawler type harvesting machines in 2024, the top 5 manufacturers collectively accounted for 96.8% of the market share. Weichai Lovol ranked second with a sales volume of 15.1 thousand units, holding a market share of approximately 23.1%.

Crawler Type Harvesting Machines Market Ranking and Market Share (by sales volume), China, 2024

Ranking	Company Name	Sales Volume (thousand units)	Market Share (%)
1	Company B	39.1	59.9%
2	The Company	15.1	23.1%
3	Company C	4.7	7.2%
4	Company L	2.3	3.5%
5	Company M	2.1	3.1%
	Others	2.1	3.2%
	Total	65.3	100.0%

Note: Company M is a company located in Jiangsu, China, primarily engaging in sales of agricultural machinery, diesel engines, and related components. It was established in 1998 and is owned by a Japanese agricultural machinery company.

Source: China Association of Agricultural Machinery Manufacturers, Frost & Sullivan

In terms of the sales volume of intelligent harvesting machines in 2024, the top 5 manufacturers collectively accounted for 97.2% of the market. Weichai Lovol ranked first with a sales volume of 20.9 thousand units, holding a market share of approximately 66.0%.

Intelligent Harvesting Machines Market Ranking and Market Share (by sales volume), China, 2024

Rank	Company Name	Sales Volume (thousand units)	Market Share (%)
1	The Company	20.9	66.0%
2	Company B	6.4	20.2%
3	Company L	1.9	5.9%
4	Company C	0.8	2.6%
5	Company H	0.8	2.5%
	Others	0.9	2.8%
	Total	31.7	100.0%

Source: Frost & Sullivan

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Analysis of China's Agricultural Implements Market

Market Size of Agricultural Implements

Agricultural implements refers to the supporting equipment used in agricultural production, primarily for field preparing, planting, field management, straw handling, grain drying, and other operations. Types of agricultural implements include hydraulic reversible plough, rotary tillers, seeding machines, fertilizer spreaders, sprayers, balers, and agricultural dryers.

The market size of China's agricultural implements was approximately RMB20.4 billion in 2024, and it is projected to further grow to RMB34.5 billion by 2030, with a CAGR of about 9.1% during this period. In the agricultural implements market in 2024, the sales volumes of transplanter, seeding machines, balers, and agricultural dryers were 104.8 thousand units, 125.4 thousand units, 20.3 thousand units, and 15.1 thousand units, respectively. In the future, it is expected that the market demand for transplanter, seeding machines, balers, and agricultural dryers will show a slight increase, and by 2030, the market sales volumes will reach 156.3 thousand units, 185.8 thousand units, 22.8 thousand units, and 20.6 thousand units, respectively.

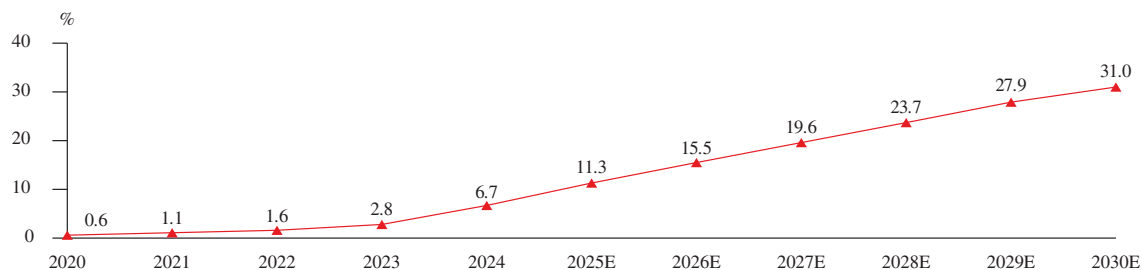
Analysis of Intelligent Agricultural Implements Market Analysis

Intelligent agricultural implements generally refer to agricultural implements equipped with functions such as operation monitoring, intelligent control, or ISOBUS technology.

The degree of intelligence in intelligent agricultural implements is primarily reflected in their capabilities for precise operation monitoring, automated control, and intelligent regulation. For example, precision seeding technology ensures seeds are placed at optimal positions, improving accuracy and efficiency in seeding. Precision fertilization technology allows nutrient application to be tailored to soil nutrient levels and crop needs, reducing waste while conserving resources. Currently, China's intelligent agricultural implement sector remains in its early stages of development. However, the emergence of intelligent, high-end agricultural implements, such as high-performance intelligent seeders, has been encouraged and supported by subsidy policies. It is expected that the overall penetration rate of intelligent agricultural implements in China will continue to grow steadily, further increasing to approximately 31.0% by 2030.

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Penetration Rate of Intelligent Agricultural Implements in the Agricultural Implements Market (by sales volume), China, 2020-2030E



Source: Frost & Sullivan

Drivers for China's Agricultural Machinery Industry

- 1) Grim situation of food security: China, as a country with large population, is facing prominent contradiction between food demand and arable land resources, which has in turn promoted the agricultural operation model to accelerate transformation, and the rapid development of intelligent agricultural machinery and smart agriculture.***

Being a country with a population of 1.4 billion, China has a rigid food demand and is therefore suffering pressure in satisfying the huge demand. Although the self-sufficiency rates for staple food such as wheat, corn and rice have exceeded 95%, as the room for expansion is constrained by the existing scale of farmland of 1.9 billion mu, the dependency rates of imported oil crops and fodder such as soybeans remained high at 80%. In 2024, China's agriculture production reached 710 million tonnes and total agriculture import reached 160 million tonnes. Structural shortages have in turn promoted the transformation and upgrade of agricultural productivity and operation models, while urgent need to increase per-unit yield has facilitated rapid growth in the demand for intelligent agricultural machinery and smart agriculture.

- 2) Structural changes in labor force: Adjustment to the structure of rural labor force has promoted the development and intelligent upgrading of high-end agricultural machinery***

China's rural labor force is undergoing profound structural transformation. The number of agricultural workforce declined to 160 million in 2024, and is projected to further decline to 30 million by 2050. Such decline in the number of agricultural workforce has, on one hand, brought two direct consequences: a sustained increase in agricultural labor costs, and a severe shortage in labor supply, this is particularly the case during peak farming seasons. On the other hand, the new generation of practitioners possesses relatively higher levels of education and

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professional skills, and their acceptance and application capabilities for intelligent technologies have significantly improved. The contradiction of demand for the agricultural workforce is driving the upgrade towards large-scale, high-end and intelligent agricultural machinery.

3) Deepening the scalable field management: Intensification of agricultural operations has given rise to demand for efficient and intelligent equipment

The area of land transfer in China increased from 460 million mu in 2016 to 580 million mu in 2024. The government continues to promote the construction of high-standard farmland and driving contiguous land transfer through integration of village collectives. Land transfer has now entered a stage of dual-driven development, characterized by “scale expansion and quality improvement”. The customer structure is upgrading rapidly. Family farms, planting cooperatives, and other new types of business entities and agricultural service organizations with planting areas of more than 100 mu are developing rapidly. The scaling, intensification, and intelligent upgrading of agricultural operations are accelerating. Large-scale operations are imposing new requirements on agricultural machinery. Traditional small-sized machinery can no longer meet the needs of large-scale operations, and the market is shifting towards large-scale, high-end, and intelligent equipment.

4) Strong national policy support: driving the accelerated development of intelligent agricultural machinery and smart agriculture

Food security is a top national priority. Given constraints on arable land, only significantly improve the per-unit yield of grains can China remove the bottleneck of grain production. China has identified intelligent agricultural machinery as a strategic tool to safeguard food security. Through systematic policy arrangements, the nation is accelerating the industry’s upgrade. The “Plan for Accelerating the Construction of an Agricultural Powerhouse (2024-2035) (《加快建設農業強國規劃(2024-2035年)》)” and consecutive central No. 1 documents have clearly defined the development direction for agricultural machinery, systematically promoting the comprehensive upgrade of agricultural machinery. The implementation of agricultural machinery purchase and application subsidy policies focuses on intelligent and efficient “high-quality machinery” such as power-shift/continuously variable transmission tractors, large-capacity harvesting machines, high-end precision planters and Beidou navigation-assisted driving systems, promoting the widespread adoption of high-end intelligent equipment. The “National Smart Agriculture Action Plan (2024-2028) (《全國智慧農業行動計劃(2024 – 2028年)》)” supports the development and application of smart agriculture technologies, including AI, intelligent driving, precision operations, and remote sensing monitoring. It also supports the construction of smart agriculture demonstration bases, accelerating technological iteration through scenario-driven approaches. With the impetus of this policy package, intelligent agricultural machinery and smart agriculture will embrace a golden age of development.

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5) *Technological integration and innovation breakthroughs: empowering the accelerated development of intelligent agricultural machinery and smart agriculture*

In recent years, technological breakthroughs in multiple fields such as electro-hydraulic control, remote communication, cloud computing, and artificial intelligence have been profoundly reshaping the technological system of the agricultural machinery industry. The integration of electro-hydraulic automatic control technology with automatic navigation and ISOBUS technology has achieved a leapfrog improvement in the precision operations of agricultural machinery. The integrated application of perception networks, multimodal visual recognition, AI decision-making algorithms and precision operation technologies has propelled agricultural production from experience-based traditional models to data-driven smart agriculture. Meanwhile, the rapid penetration of new energy technologies in the automotive and engineering machinery sectors has created synergies in the technology reserve and supply chain of battery, electric motor, and electronic control, accelerating the iterative upgrading of agricultural machinery towards electrification, low-carbon development and intelligentization.

Development Trends of China's Agricultural Machinery Industry

1) *The transformation and upgrading of traditional agricultural machinery equipment to large-scale, high-end, and intelligent agricultural machinery. Meanwhile, integrated set of intelligent agricultural machinery system solutions are gradually becoming the mainstream demand of customers*

The scalable field management is driving a surge in demand for large-scale, high-end, and intelligent equipment. In terms of tractors, small and medium horsepower tractors are continuously upgrading to large tractors with over 100 horsepower, with transmission technologies evolving towards power shift and continuously variable transmission. The level of electro-hydraulic control and other intelligent technologies is constantly improving, and automatic navigation technology is being rapidly popularized. In terms of harvesters, there is an increasing focus on reducing losses and improving efficiency during harvesting, while the demand for comfort in operation continues to grow. Large harvesters equipped with grain monitoring and intelligent control functions for operations are becoming a trend. In terms of agricultural implements, the demand for high-end machinery such as high-speed precision planters, large self-propelled smart sprayers, large high-density square balers, and large batch dryers is increasing, with a greater emphasis on achieving coordinated control between the machinery and tractors.

China's agricultural machinery industry is transitioning from selling individual equipment to an technology of the products ecological transformation of "product + service". The ISOBUS technology of the products creates a digital channel between power machinery and working machinery, and relies on the agricultural machinery IoT system to achieve interconnectivity of equipment across all stages of farming such as field preparing, planting, crop protection, and harvesting. Functions such as intelligent adjustment of operating parameters, coordinated scheduling of multiple machines, and remote operation and maintenance management are realized, forming a comprehensive intelligent agricultural machinery system solution covering the entire process of field preparing, planting, management, and harvesting. This not only improves operational efficiency and enhances user experience but also establishes a product competitive barrier that is hard to break through.

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2) Rapid development of new energy technology, empowering accelerated intelligence of vehicle

China's new energy agricultural machinery is undergoing development under a dual acceleration trend of technological breakthroughs and policy-driven initiatives. On the policy side, the state has gradually included new energy agricultural machinery in the key purchase subsidies, with subsidies from 2024 to 2026 tilting towards the "dual carbon" goals to accelerate market promotion. On the technical side, the continuous optimization of battery energy density and intelligent control algorithms, along with the gradual improvement of charging infrastructure, and the spillover effect of the automotive industry's "three-electric" supply chain, are driving new energy agricultural machinery from pilot projects to scaled applications. Meanwhile, the precise control of the electric drive system, in-depth interaction of data, continuous evolution of software-defined functions, and the construction of a collaborative ecosystem, will restructure the architecture of complete-vehicle intelligence system, propelling the development of agricultural machinery from "mechanical automation" to "digitalization."

3) Technological breakthroughs and scenario implementation are spawning a broad market for agricultural robots

Agricultural robots are intelligent automated devices designed for agricultural production processes, integrating multiple disciplines such as artificial intelligence, sensor technology, automatic control, and mechanical engineering. As a technological extension of intelligent agricultural machinery, agricultural robots have a high degree of autonomy, with capabilities for environmental perception (such as vision, LiDAR), path planning, and autonomous decision-making. Its core function is to replace or assist manual labor in tasks such as planting, management, harvesting, and sorting to improve efficiency, reduce costs, and achieve precision agriculture. Agricultural robots have main application fields in complex scenarios such as drylands, paddy fields, orchards and facility agriculture. Agricultural robots can be divided into two types based on their physical structure: one is an extension of the existing physical architecture of agricultural machinery, such as driverless tractors; the other one is a new type of architecture robot that breaks away from the traditional agricultural machinery architecture, focusing on lightweight and agility, such as intelligent universal platforms, humanoid robots, quadruped robots and hexapod robots.

Agricultural robots possess four core advantages: precision operations, all-weather operations, adaptability to complex scenarios, and intelligent decision-making collaboration. They will gradually become an important participant in future smart agriculture and a key carrier for reshaping modern agricultural operation models. The current market size of agricultural robots in China is approximately RMB190 million, and it is projected to reach about RMB2.5 billion by 2030, with applications gradually being promoted. By 2050, the market is expected to further expand to about RMB68.1 billion, playing an increasingly important role in agriculture in the future.

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4) *Smart agricultural technologies are accelerating their development towards integrated technical applications, with an intensified commercialization process seen in smart agricultural services*

Based on intelligent agricultural machinery and empowered by technologies such as biotechnology, information perception, intelligent decision-making, and precision operation, smart agriculture will drive agriculture from “experience-driven” to “data-driven”. AI technology based on information perception and optimized deep learning algorithms is rapidly penetrating the intelligent agricultural machinery and smart agriculture fields. By integrating multi-dimensional data such as soil, meteorological, and crop growth, as well as building an intelligent decision-making model covering the whole process from field preparing, planting, managing to harvesting, the smart agriculture management platform enables the intelligent agricultural machinery to achieve precision operation, thereby efficiently contributing to the increase in per-unit yield and the green and sustainable development. Focusing on “increasing production, reducing losses, cutting costs and improving efficiency”, China’s smart agriculture is currently in a transition period from pilot demonstrations to large-scale application in certain regions. The integration of digital technology and modern agriculture has begun to bear fruits. In the future, the rapid development of technologies such as AI, intelligent driving, precision operations and remote sensing monitoring will promote accelerated all-scenario application of smart agriculture.

5) *The after-sales market of agricultural machinery is accelerating the transformation towards full life-cycle management, driving the industry to embrace structural development opportunities*

The after-sales market for agricultural machinery is undergoing a value chain reconstruction from “equipment sales” to “full life-cycle services”. As the customer base will evolve more rapidly towards being organized, younger, and more professional in the future, there will be a growing rigid demand for genuine spare parts and professional repair and maintenance services. Meanwhile, the Internet of Things (IoT) and big data technologies are driving the intelligent upgrading of repair and maintenance services. For example, remote fault warnings are enabled through equipment connectivity, demonstrating that the service model is shifting from “reactive repair” to “proactive prevention”. Technological upgrade has been able to continuously expand the value-added space of service in after-sales market. Driven by both improvements in product reliability and support from scrapping and updating policies, the value of second-hand agricultural machinery is significantly enhanced. This transformation trend has been proven by the practice in agricultural machinery industry of Europe and America. Taking a global giant in the agricultural machinery industry as an example, it achieves global equipment networking through digital and intelligent platform, thereby constructing an intelligent closed-loop service system covering fault warnings, remote diagnosis and sales of spare parts. In 2024, revenue from its spare parts business accounted for nearly 20% of the total revenue. In the coming future, the after-sales market with main focus on spare parts and second-hand machinery will serve as a new value growth point for agricultural machinery industry.

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6) China's agricultural machinery exports are entering a strategic opportunity period, combining emerging market expansion with rising global competitiveness

In recent years, China's agricultural machinery export volume has continued to expand, with products accelerated their penetration into the global market thanks to their high cost-performance advantage. The export map has expanded to more than a hundred countries and regions worldwide, with significant growth in emerging markets such as Southeast Asia, Latin America, and Africa. Leading companies in the industry are continuously enhancing product and service competitiveness by establishing overseas innovation centers and promoting local manufacturing and sales operations. The next 5-10 years will be a strategic opportunity period for Chinese agricultural machinery to go global, due to continued national policy dividends. The agricultural modernization process of relevant countries will resonate deeply with China's agricultural machinery industry. Meanwhile, the transformation towards high-end and intelligent products will continuously strengthen the global competitiveness of Chinese agricultural machinery, with the potential for breakthroughs in the high-end market.

Entry Barriers for China's Agricultural Machinery Industry

1) Barrier to Understanding Agricultural Application Scenarios

Agricultural application scenarios are complex and variable, covering different crops, soil types, and climatic conditions, with significant differences in crop varieties and farming practices across regions. A deep understanding of agricultural machinery operation scenarios requires long-term practical experience. Agricultural machinery data and farming practices data are core assets for enterprises and constitute the core competitiveness of leading agricultural machinery companies. It is challenging for new entrants to build equivalent levels of experience, capabilities, and data assets.

2) Customer and Brand Barriers

The customer structure of the agricultural equipment market has undergone profound changes. The proportion of individual machine operators purchasing agricultural machinery has been declining year by year, while professional machine operators, agricultural machinery cooperatives, and socialized service organizations have emerged as the primary buyers. The primary considerations in purchasing agricultural machinery are performance, reliability, and brand. Building brand recognition requires long-term, large-scale market validation and the accumulation of users' praises. It is challenging for new entrants to gain brand recognition from users in a short period.

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3) *Service Barrier*

Agricultural production has distinct seasonality, and agricultural machinery companies must have the flexibility to meet the surging seasonal service demands, especially demands from customers engaged in cross-regional operations who heavily rely on 24/7 response, rapid repairs and spare parts supply. Building nationwide service networks, developing professional service teams, and establishing digital service platforms (such as remote monitoring and fault warning systems) all require continuous financial investment and prolonged time period. Currently, only a few companies in the industry possess full-process cross-regional service capabilities, and service response speed and service quality have become core competitive edges that new entrants find difficult to replicate.

4) *Industrial Chain Resource Barrier*

The high-end intelligent agricultural machinery business has significant industry chain barriers. All global leading companies in the industry possess the capability to make independent research and development, and manufacture core parts such as high-performance engines, high-end electronic chassis, wet clutches, high-precision control valves, intelligent sensors and controllers. To develop high-end intelligent agricultural machinery, it is necessary to have a full control of core technologies, core manufacturing capabilities, and global supply chain resources. And the establishment of sales networks and after-sales support systems covering the entire operation area, including spare parts supply, maintenance services and technical support, is also necessary for downstream distribution service. It is challenging for new entrants to build core capabilities in the industrial chain.

5) *Talent Barrier*

The industry faces dual challenges of a shortage of multi-disciplinary talents and an incomplete talent development system. The research and development of intelligent agricultural machinery requires personnel with both mechanical engineering and information technology backgrounds, but the related interdisciplinary programs are relatively underdeveloped in universities, resulting in a limited number of graduates annually. On the corporate side, the training period for technical personnel with practical field experience is lengthy, typically 3 to 5 years. Geographically, agricultural machinery companies are primarily concentrated in industrial bases, which are misaligned with the talent-rich first-tier cities, further intensifying the difficulty of talent competition.

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6) *Technical Barriers*

Enterprises need to engage in long-term technological R&D, field trials, and continuous improvement to develop high-reliability, adaptive products. Due to strong seasonality of agricultural machinery operations, usually with annual effective operating window under two months, new entrants often need several years of accumulation to launch mature models. The technical barriers in the intelligent agricultural machinery field are even more prominent, mainly reflected in the integration of multi-disciplinary technologies and the ability for rapid iteration. Its development requires the integration of technologies from multiple fields such as mechanical engineering, automatic control, and artificial intelligence. For example, the development of intelligent driving systems needs to simultaneously break through three major technological bottlenecks: GNSS (Global Navigation Satellite System) high-precision positioning, AI decision-making algorithms (operation path planning, obstacle recognition), and complete-vehicle intelligent control. In addition, customer awareness and data assets form invisible barriers. The in-depth understanding of agricultural machinery operation scenarios requires long-term practical accumulation, and core resources such as data from farming activities and equipment operation logs have already been accumulated by established companies as data assets, making it difficult for new entrants to quickly build an equivalent level of service capabilities.

Analysis of China's Agricultural Machinery Import and Export

With the continuous enhancement of China's agricultural machinery industry in terms of technological level, domestic production capacity, and global competitiveness, the export value of China's agricultural machinery has shown a gradual upward trend. In 2024, the export value of major agricultural machinery products in China, including tractors, harvesting machines, field preparing and field management machines, was approximately RMB14.9 billion, an increase of 12.3% compared to 2023. Among these, the export value of main machinery products such as tractors and harvesting machinery was RMB10.2 billion, with a year-on-year growth of 7.0%. The global competitiveness of Chinese agricultural machinery is gradually increasing.

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China's agricultural machinery imports are primarily concentrated in high-horsepower tractors and harvesting machines, with major import sources including France, Germany, and the United States.

Agricultural Machinery Import and Export Value by Equipment Type in China, 2022-2024

Type	2022 (RMB billion)		2023 (RMB billion)		2024 (RMB billion)	
	Export	Import	Export	Import	Export	Import
Tractors	5.5	0.5	6.9	1.0	6.7	1.2
Harvesting machine . .	2.2	2.5	2.6	4.1	3.5	1.8
Agricultural implements	3.9	0.3	3.7	0.4	4.7	0.4
Total	11.5	3.3	13.3	5.5	14.9	3.4

Note: Agricultural implements includes field preparing and field management machines, etc.

Source: General Administration of Customs of China, China Chamber of Commerce for Import and Export of Mechanical and Electrical Products

Tractors are China's most prominent agricultural machinery export product. In terms of export volume in 2024, the top five manufacturers accounted for 77.7% of total tractor exports. Weichai Lovol ranked first with export volume of 13.7 thousand units, achieving a market share of about 33.8%.

Ranking and Market Share of Tractor Export (in terms of export volume) in China, 2024

Rank	Company Name	Export Volume (thousand units)	Market Share (%)
1	The Company	13.7	33.8%
2	Company A	7.1	17.6%
3	Company L	4.6	11.4%
4	Company N	3.2	7.9%
5	Company F	2.8	7.0%
	Others	9.0	22.3%
	Total	40.4	100.0%

Note: Company N is a company located in Shandong, China, primarily engaging in sales of agricultural vehicles, tractors, and tires.

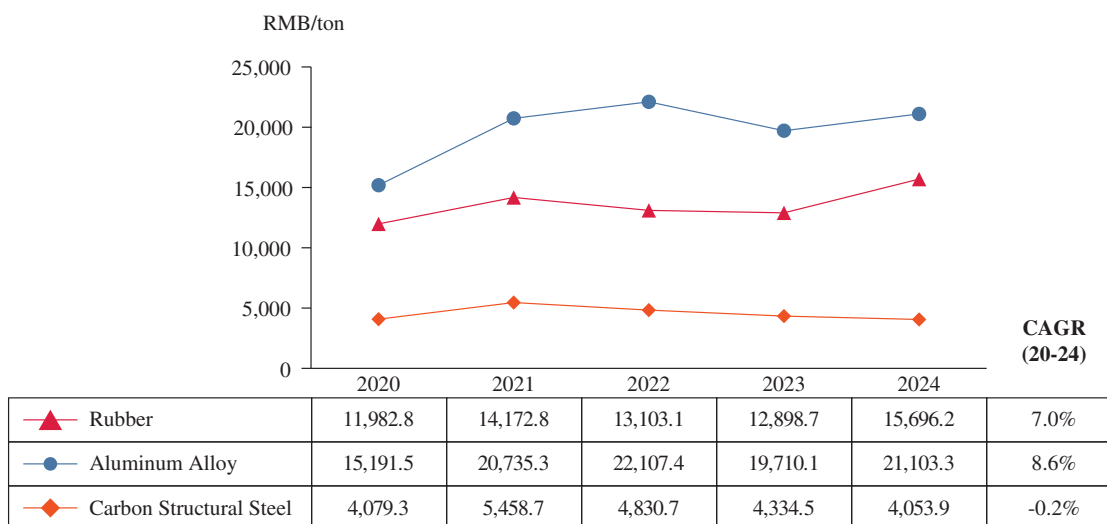
Source: China Association of Agricultural Machinery Manufacturers, Frost & Sullivan

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Analysis of Agricultural Machinery's Raw Materials

The price of carbon structural steel rose from RMB4,079.3 per ton in 2020 to a peak of RMB5,458.7 per ton in 2021 before declining year by year, reaching RMB4,053.9 per ton in 2024. The price of aluminum alloy increased continuously from RMB15,191.5 per ton in 2020 to RMB22,107.4 per ton in 2022. After a slight correction in 2023, prices remained high at RMB21,103.3 per ton. From 2020 to 2024, the price of rubber fluctuated upward from RMB11,982.8 per ton to RMB15,696.2 per ton, with a minor dip during 2022 to 2023.

Price of Agricultural Machinery's Raw Materials, China, 2020-2024



OVERVIEW OF CHINA'S SMART AGRICULTURE INDUSTRY

Definition and Classification of China's Smart Agriculture Industry

Smart agriculture is a new agricultural production and management model based on intelligent agricultural machinery and integrating biotechnology, information technology, artificial intelligence and big data technology to enable digital sensing, intelligent decision-making, precision operations and smart management across the entire agricultural production process. An integrated smart agriculture solution is a systematic solution providing a suite of intelligent agricultural equipment and digital, interconnectivity services grounded on the industrial essence of smart agriculture. Based on technological applications and functional attributes, an integrated smart agriculture solution primarily includes intelligent agricultural machinery and smart agriculture services. Smart agriculture services encompass comprehensive agricultural monitoring systems, precision operation systems, and smart agriculture management platforms.

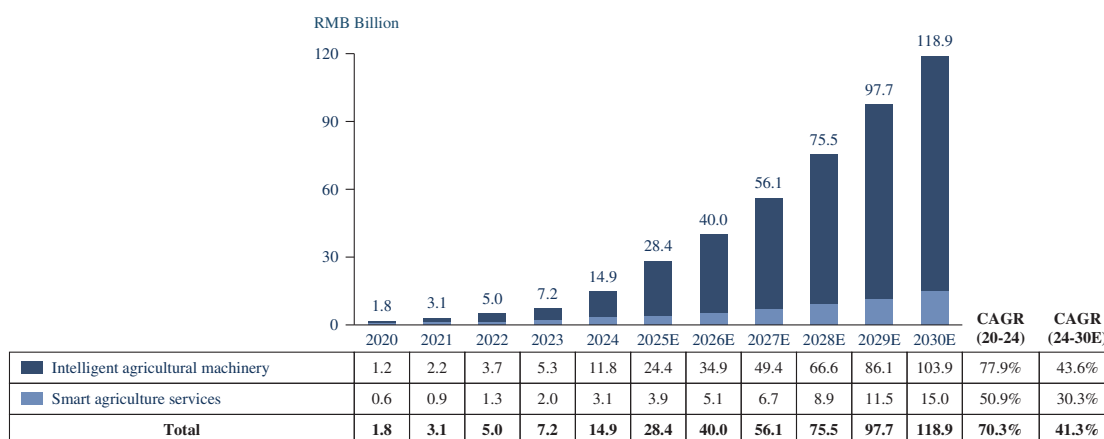
INDUSTRY OVERVIEW

Market Size of China’s Smart Agriculture Industry

From 2020 to 2024, the global market size for integrated smart agriculture solutions expanded from RMB560.0 billion to RMB836.3 billion, representing a CAGR of 10.5%, which is projected to grow further to RMB1,033.3 billion by 2030. Smart agriculture in Europe and the United States has been highly developed in terms of intelligent agricultural machinery, comprehensive agricultural monitoring, precision operation and smart agriculture management platform technology: precision operation technology was introduced in the 1990s, enabling variable-rate application; after the 21st century, GPS-guided intelligent agricultural machinery became widespread, with automation rates exceeding 80%; after 2014, big data-driven smart agriculture management platforms commenced commercial application. In 2024, revenue from smart agriculture services of global leading enterprises accounted for more than 5% as a percentage of total revenue, and continued to grow, compared with less than 1% of major leading enterprises in China, which were still at their early stages of development.

From 2020 to 2024, China’s market size for integrated smart agriculture solutions expanded from RMB1.8 billion to RMB14.9 billion, representing a CAGR of 70.3%. Policy support and market demand will drive the accelerated development of smart agriculture in China. China’s smart agriculture will gradually transition from pilot demonstrations to large-scale applications. It is projected that by 2030, the market size for integrated smart agriculture solutions will reach RMB118.9 billion, with smart agriculture services accounting for RMB15.0 billion.

Market Size of Integrated Smart Agriculture Solutions (in terms of sales revenue, by business type), China, 2020-2030E



Source: Frost & Sullivan