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ANALYSIS OF OFF-HIGHWAY POWER TRANSMISSION SYSTEMS AND MACHINERY INDUSTRY

Definition and Classification of Off-Highway Power Transmission Systems and Machinery Industry

The off-highway power transmission systems and machinery industry focuses on the design, manufacturing, and integration of components that transmit power and control motion, while supporting and withstanding significant external loads and forces generated in harsh operating conditions, thereby forming the technical backbone of mechanized industrial and mobile equipment.

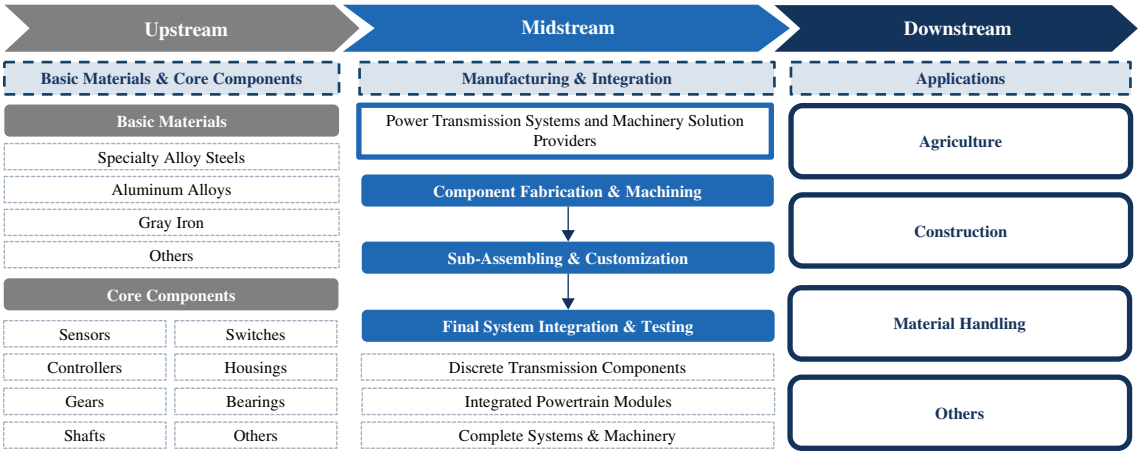
In terms of technology routes, off highway power transmission systems and machinery can be broadly classified into four main categories based on how traction energy is generated and transmitted: conventional, hydrostatic, hybrid, and electric systems. In conventional vehicles, power is generated by an internal combustion engine and transmitted to the wheels through different power transmission technologies, ranging from the simplest purely mechanical solutions to more advanced systems such as full powershift transmissions, designed to ensure high performance and continuous torque delivery. In hydrostatic systems, the mechanical power produced by the internal combustion engine is converted into hydraulic power by a pump and then reconverted into mechanical power by a hydraulic motor. This architecture allows greater operational flexibility and enables a reduction in the number of gear ratios required. Hybrid transmission systems combine an internal combustion engine with an electric generator, batteries, and one or more electric motors. This configuration makes it possible to optimize the operating efficiency of the internal combustion engine, thereby improving overall system efficiency and reducing fuel consumption and emissions. Finally, in fully electric vehicles, the electrical energy stored in the batteries is directly converted into mechanical power by electric motors and then transmitted to the wheels, eliminating the need for an internal combustion engine.

In terms of downstream applications, the off-highway power transmission systems and machinery industry can be categorized into agriculture, construction, material handling, and others. The agricultural sector includes tractors, combine harvesters, and others. The construction sector includes excavators, loaders, cranes, mobile elevating work platform (MEWP), and others. The material handling sector includes mainly forklifts. Others mainly include applications in mining, ports, and forestry fields.

Value Chain of Off-Highway Power Transmission Systems and Machinery Industry

The upstream of the off-highway power transmission systems and machinery industry includes the basic materials such as specialty alloy steels, aluminum alloys, and gray iron, as well as core components such as sensors, switches, controllers, gears, bearings, shafts, etc. The midstream includes manufacturing and integration services provided by power transmission systems and machinery solution providers. The downstream of the off-highway power transmission systems and machinery industry includes applications in fields such as agriculture, construction, material handling, etc.

Value Chain of Off-Highway Power Transmission Systems and Machinery Industry

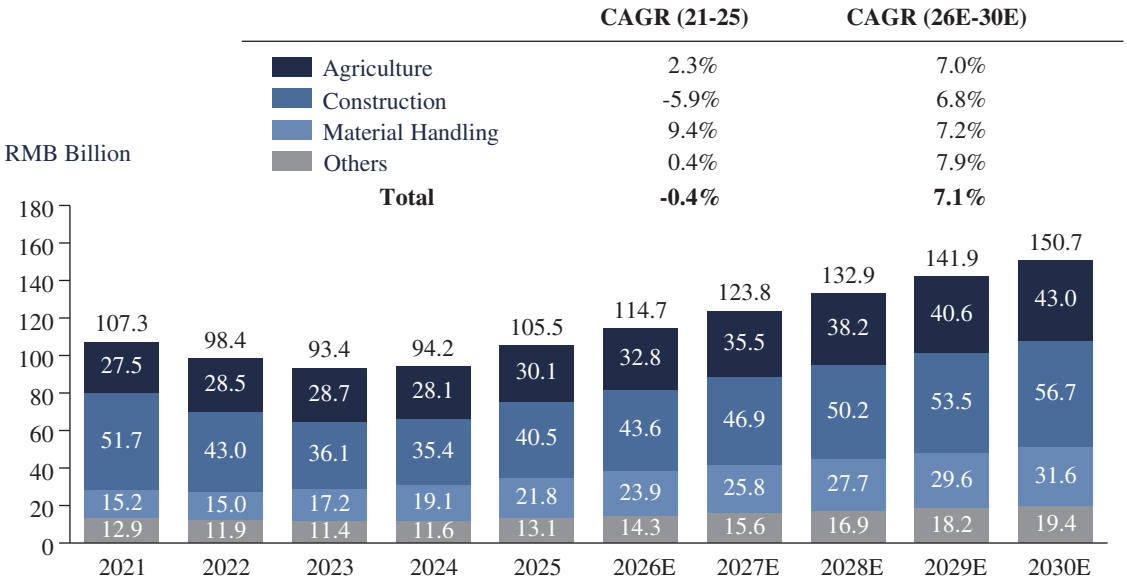


Source: Frost & Sullivan

Market Size of Off-Highway Power Transmission Systems and Machinery Market

China's off-highway power transmission systems and machinery market experienced a period of fluctuation from 2021 to 2025, primarily due to a cyclical downturn, characterized by the saturation of urban infrastructure and a decline in real estate investment. Nevertheless, the market staged a robust recovery in 2025, driven by government subsidies for equipment upgrades, the accelerated adoption of electric powertrains, and resilient export growth, signaling a new growth cycle fueled by technological transformation. The market size of China's off-highway power transmission systems and machinery market decreased from RMB107.3 billion in 2021 to RMB105.5 billion in 2025, with a CAGR of -0.4% during the period. Looking ahead, the imperative is anticipated to shift from initial capacity built-out to system optimization, with innovation focused on safety, reliability, and digital intelligence. The market size of off-highway power transmission systems and machinery market in China is expected to reach RMB150.7 billion in 2030, representing a CAGR of 7.1% from 2026 to 2030.

Market Size of Off-Highway Power Transmission Systems and Machinery Market (revenue breakdown by downstream applications), China, 2021-2030E



Source: Frost & Sullivan

Note: Others mainly include applications in mining, port, and forestry fields.

Market Size of Construction Power Transmission Systems and Machinery Market

The construction power transmission systems and machinery market encompasses sectors such as excavators, loaders, cranes, MEWP, and others.

The construction power transmission systems and machinery market size in China decreased from RMB51.7 billion in 2021 to RMB40.5 billion in 2025, primarily due to prolonged property sector delivering and a downturn in new construction starts. However, large-scale national projects, particularly in transportation, energy, and new urbanization, created sustained equipment demand in 2025 and stimulated the growth of the sector. Looking ahead, export will remain the primary growth driver of the market, with export-led upgrades reshaping the industry toward advanced power transmission solutions and intelligent control systems. China's construction power transmission systems and machinery market size is expected to achieve RMB56.7 billion in 2030, representing a CAGR of 6.8% from 2026 to 2030.

China's construction power transmission systems and machinery in the excavator sector is the largest category, which occupied approximately 35% of the total market in 2025. Supported by equipment replacement cycles triggered by stricter emission standards and continued technological upgrade, the market size of China's construction power transmission systems and machinery in the excavator sector is expected to reach RMB22.2 billion in 2030, representing a CAGR of 9.1% from 2026 to 2030, which is the highest among all categories.

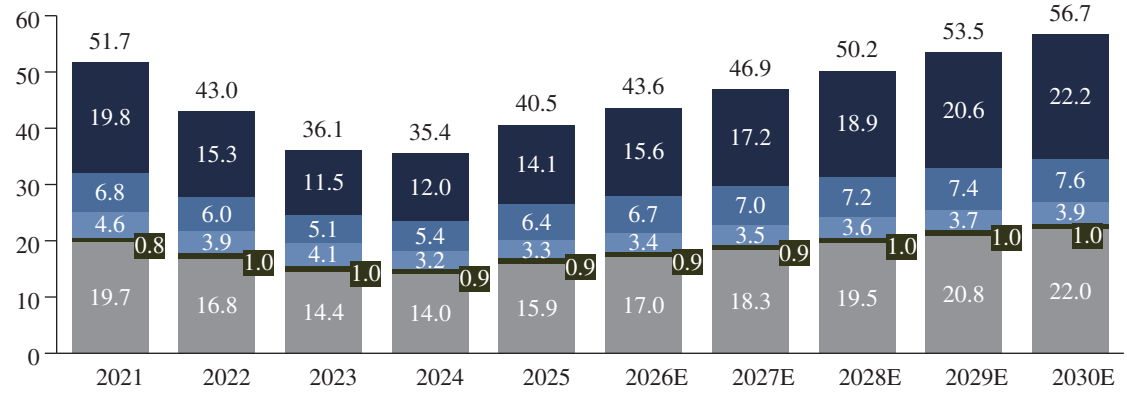
The market size of China's construction power transmission systems and machinery in the loader sector accounted for more than 15% market share in 2025. Driven by continued infrastructure investment, and ongoing technological upgrading of loaders toward higher performance and lower emissions, the market size of China's construction power transmission systems and machinery in the loader sector is expected to reach RMB7.6 billion in 2030, representing a CAGR of 3.4% from 2026 to 2030.

The market size of China's construction power transmission systems and machinery in the crane sector accounted for more than 8% market share in 2025. Supported by new infrastructure construction demand, the market size of China's construction power transmission systems and machinery in the crane sector is expected to reach RMB3.9 billion in 2030, representing a CAGR of 3.3% from 2026 to 2030.

The market size of construction power transmission systems and machinery in the MEWP sector achieved RMB0.9 billion in 2025. Propelled by wider adoption of rental fleet business model and integration with smart construction site management, the market size of construction power transmission systems and machinery in the MEWP sector is expected to growth at a CAGR of 3.7% from 2026 to 2030, reaching RMB1.0 billion in 2030.

Market Size of Construction Power Transmission Systems and Machinery Market (revenue breakdown by downstream applications), China, 2021-2030E

	CAGR (21-25)	CAGR (26E-30E)
Excavators	-8.1%	9.1%
Loaders	-1.4%	3.4%
Cranes	-7.9%	3.3%
MEWP	3.4%	3.7%
Others	-5.3%	6.6%
Total	**-5.9%**	**6.8%**



Source: Frost & Sullivan

Note: Others primarily include dozers, pavers, scrapers, etc.

Market Size of Agricultural Power Transmission Systems and Machinery Market

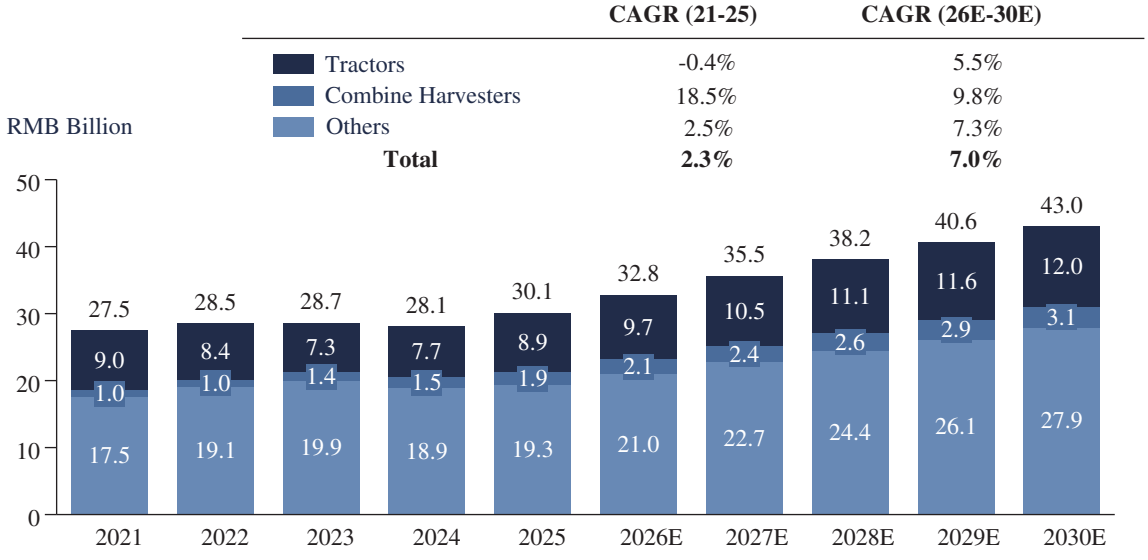
The agricultural power transmission systems and machinery market encompasses sectors such as tractors, combine harvesters, and others.

The agricultural power transmission systems and machinery market size in China increased from RMB27.5 billion in 2021 to RMB30.1 billion in 2025, with a CAGR of 2.3% during the period. The market driver was primarily anchored in agricultural modernization and productivity gains. Macro-level policy initiatives strongly promoted mechanization across staple crop farming to bolster food security. In the future, the growth vector will be on precision and intelligence, marking a transition from mechanical replacement to smart system integration. China's agricultural power transmission systems and machinery market size is expected to achieve RMB43.0 billion in 2030, representing a CAGR of 7.0% from 2026 to 2030.

China's agricultural power transmission systems and machinery in the tractor sector is the largest category, which occupied nearly 30% market share in 2025. Driven by policies promoting agricultural mechanization and rural revitalization, the market size of China's agricultural power transmission systems and machinery in the tractor sector is expected to reach RMB12.0 billion in 2030, representing a CAGR of 5.5% from 2026 to 2030.

The market size of China's agricultural power transmission systems and machinery in the combine harvester sector accounted more than 6% of the total market in 2025. The market size of China's agricultural power transmission systems and machinery in the combine harvester sector is expected to reach RMB3.1 billion in 2030, with a CAGR of 9.8% from 2026 to 2030, which is the highest among all categories, primarily due to the expansion of large-scale farming amid rural labour shortages.

Market Size of Agricultural Power Transmission Systems and Machinery Market (revenue breakdown by downstream applications), China, 2021-2030E



Source: Frost & Sullivan

Note: Others mainly include seeders, sprayers, transplanter, harvesters, etc.

Market Drivers of Off-Highway Power Transmission Systems and Machinery Market

- ***Policy Support and Strategic Industrial Upgrades.*** The market's trajectory is primarily set by top-down national policies, which create non-cyclical demand. The "Made in China 2025" and subsequent industrial policy initiatives explicitly target the high-end equipment and core components sector, directing capital and innovation toward domestic capability. Concurrently, the "dual carbon" goals mandate a sweeping energy transition, necessitating massive investment in new power generation and a more resilient, intelligent grid. This regulatory framework ensures sustained and long-term demand for advanced transmission equipment, and provides solid fundamental for the industry's growth outlook as well as continuous R&D efforts.

- ***Domestic Supply Chain Upgrade and Technological Sovereignty.*** A critical driver is the strategic push for supply chain security and technological independence. This has accelerated the localization of core components, such as high-precision bearings, advanced controllers, and specialized alloys, which were previously imported. The industry is no longer only assembling systems but is deepening its mastery over the entire value chain, which urges manufacturers to innovate and transforms the sector from a volume producer to a technologically integrated powerhouse capable of meeting its increasingly sophisticated industrial needs.

- ***Evolving Demand from Next-Generation Industrial Ecosystems.*** The market is fundamentally propelled by the sophisticated requirements of China's own industrial transformation. The rapid ascent of strategic industries, particularly new energy vehicles and robotics, creates an entirely new tier of demand for power transmission systems and machinery. These sectors require solutions that are not only highly efficient and reliable, but also compact, intelligent, and seamlessly integratable with software-defined platforms. Consequently, manufacturers are incentivized to advance their engineering capabilities and engage in deeper collaboration with end-users, driving continuous innovation and value creation beyond traditional industrial applications.

Development Trends of Off-Highway Power Transmission Systems and Machinery Market

- ***Pervasive Intelligence and System-Level Integration.*** The dominant trend is the shift from standalone mechanical components to intelligent, interconnected systems. Digitalization is permeating the industry with equipment increasingly embedded with sensors, controllers, connectivity, and precise movement operation. This enables real-time monitoring of parameters such as vibration, temperature, and load, facilitating predictive maintenance to prevent failures and optimize performance. The integration of this operational technology with enterprise-level information systems allows for holistic energy management and production optimization.

- ***High-Efficiency and Ultra-Low Loss Power Transmission Technologies.*** Driven by the national "dual-carbon" mandate, there is intense focus on developing transmission systems that minimize energy loss. This trend is accelerating the adoption and innovation of technologies such as permanent magnet direct-drive systems, which eliminate gearbox losses, and advanced high-voltage components that reduce electrical transmission waste. Research is also directed towards new materials such as specialize composites and coatings to reduce friction in mechanical components.

- ***Standardization, Modularization, and Flexible Manufacturing.*** To meet the diverse demands of a rapidly evolving industrial landscape, the market is moving towards greater modularization. This involves designing systems with standardized and interchangeable sub-assemblies that can be rapidly configured for different applications, from construction to automotive. This approach drastically reduces design-to-market time, lowers production costs through scale, and simplifies maintenance and upgrades. It enables manufacturers to offer mass customization, efficiently providing tailored solutions for various sectors, thereby enhancing supply chain responsiveness and resilience.

- ***Rapid Electrification.*** The machinery sector is witnessing a decisive shift toward hybrid and fully electric equipment, fundamentally redefining power transmission system requirements. As sustainability mandates tighten and operational efficiency expectations rise, traditional mechanical powertrains are evolving into integrated electromechanical architectures. This transition demands highly responsive, compact, and intelligent transmission solutions capable of managing complex power flows between combustion engines, electric motors, and battery systems. This trend requires manufactures to possess deep domain expertise to develop modular e-drive units and control systems that enable seamless electrification.

- ***From MEGA-Projects to Fragmented Service-Oriented Demand.*** The power transmission market is undergoing a structural realignment as demand starts to shift away from large-scale infrastructure contracting toward a highly fragmented landscape of maintenance, rental, and small-scale mechanization. Industrial operations have become more decentralized, with diverse equipment fleets requiring agile, customized aftermarket support rather than standardized bulk supply. Suppliers capable of delivering precision-engineered powertrain components across multiple channels and varied duty cycles are increasingly essential partners in this evolving ecosystem.

Cost Analysis of Off-Highway Power Transmission Systems and Machinery Industry

The cost of power transmission systems and machinery primarily encompasses core mechanical components, drive and control components, and others.

Core mechanical components include gears, bearings, shafts, couplings, clutches, brakes, etc., and account for approximately 45% of the total cost. Drive and control components include gearboxes, controllers, sensors, drives, valves, etc., and occupy approximately 40% of the total cost. The remaining 15% of the cost lies on others, such as housings and frames.

COMPETITIVE ANALYSIS OF OFF-HIGHWAY POWER TRANSMISSION SYSTEMS AND MACHINERY INDUSTRY

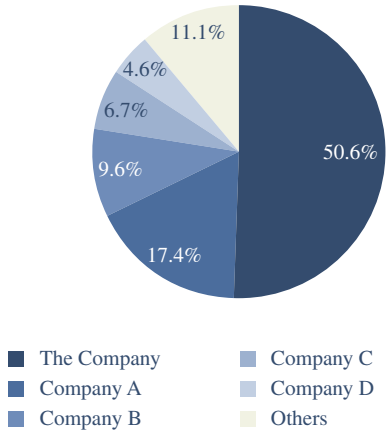
Competitive Landscape of China's Off-Highway Power Transmission Systems and Machinery Market

The competitive landscape of China's off-highway power transmission systems and machinery market features a clear division between OEMs and specialized component manufacturers. While OEMs focuses on system integration, specialized suppliers excel in focused innovation, cost efficiency, rapid customization. Their deep expertise in specific sectors allows them to establish collaborative, and long-term partnerships with OEMs, accelerating technological upgrades and supporting the shift toward electrification. By offering flexible, scalable solutions, specialized component manufacturers have become indispensable drivers of competitiveness and localization within the evolving supply chain and industry dynamics.

Ranking of Backhoe Loader Driveline Manufacturers

A backhoe loader is a compact and versatile type of loader that integrates digging, excavating, and loading functions into one machine. Its key advantage is exceptional maneuverability in tight construction sites that eliminates the need for multiple specialized machines. The market size of backhoe loader driveline in China achieved RMB634.9 million in 2025, accounting for approaching 10% of the loader power transmission systems and machinery market in China. With a revenue of RMB321.2 million in 2025, the Company was the largest backhoe loader driveline manufacturer in China, with a market share of 50.6%. The market is highly concentrated, with the top 5 manufacturers accounting for 88.9% of the total market share.

TOP 5 Backhoe Loader Driveline Manufacturers (by revenue), China, 2025



Rank	Company	Revenue (RMB Million)	Market Share
1	**The Company**	**321.2**	**50.6%**
2	Company A	110.8	17.4%
3	Company B	60.9	9.6%
4	Company C	42.6	6.7%
5	Company D	29.0	4.6%
	Others	70.4	11.1%
	Total	**634.9**	

Source: Company Reports, Frost & Sullivan

Notes:

Company A is a company headquartered in China, was established in 1969 and primarily offers drive axles for construction machinery and agricultural machinery, brakes, and steel rims for commercial and agricultural applications.

Company B is a company headquartered in China, was established in 2014 and primarily offers transmissions, drive axles, torque converters, and reducers for construction and mining equipment.

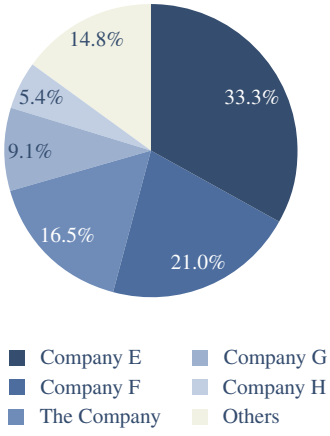
Company C is a company headquartered in Germany, was established in 1915 and primarily offers transmissions, steering systems, axles, and driveline components for automotive, commercial vehicle, and industrial applications.

Company D is a company headquartered in China, was established in 2013 and primarily offers transmissions, drive axles, torque converters, and reducers for construction machinery and industrial vehicles.

Ranking of 200 HP or above Tractor Driveline Manufacturers

Compared to smaller tractors, above 200 horsepower (HP) tractors offer greater efficiency and power for large-scale farming. Among all technology routes, driveline which mainly encompasses axles and transmission remains the dominant and highly reliable choice. It delivers better mechanical efficiency under heavy loads and continues to evolve. The market size of 200 HP or above tractor driveline in China achieved RMB2,717.2 million in 2025, accounting for over 30% of the tractor power transmission systems and machinery market in China. With a revenue of RMB447.4 million in 2025, the Company was the third largest 200 HP or above tractor driveline manufacturer in China, with a market share of 16.5%. The market is highly concentrated, with the top 5 manufacturers accounting for 85.2% of the total market share.

TOP 5 200 HP or above Tractor Driveline Manufacturers (by revenue), China, 2025



Rank	Company	Revenue (RMB Million)	Market Share
1	Company E	904.8	33.3%
2	Company F	570.0	21.0%
3	**The Company**	**447.4**	**16.5%**
4	Company G	246.1	9.1%
5	Company H	147.6	5.4%
	Others	401.2	14.8%
	Total	**2,717.2**	

Source: Company Reports, Frost & Sullivan

Notes:

Company E is a company headquartered in China, was established in 2004 and primarily offers agricultural machinery, such as tractors, harvesters, and intelligent farming solutions.

Company F is a company headquartered in China and listed on the Shanghai Stock Exchange and the Hong Kong Stock Exchange, was established in 1955 and primarily offers agricultural machinery, including tractors, harvesters, and diesel engines.

Company G is a company headquartered in China, was established in 1995 and primarily offers transmission systems, axles, and powertrain components for agricultural and construction vehicles.

Company H is a company headquartered in China, was established in 2003 and primarily offers tractors, harvesters, diesel engines, and agricultural implements.

Entry Barriers of Off-Highway Power Transmission Systems and Machinery Market

- **Technology Barrier:** The market presents a formidable technology barrier centered on the mastery of sophisticated and integrated power transmission systems rather than individual components. Success demands deep expertise in areas including precision mechanics, advanced materials science, power electronics, and embedded control software. Incumbents hold significant advantages through accumulated patents, long-term R&D in specialized fields, advanced manufacturing process know-how, etc. New entrants face the immense challenge of developing a portfolio of core technologies and system integration capabilities to meet the performance, reliability, and efficiency standards.

- **Capital Barrier:** Establishing a competitive operation requires massive and sustained capital investment beyond initial product development. Significant expenditures are necessary for acquiring precision manufacturing equipment, establishing rigorous quality control and testing laboratories, as well as building capacity capable of achieving economies of scale. The high fixed-cost structure and the need to compete on both technological sophistication and cost-efficiency create a profound barrier, favoring large and established players with strong financial backing and the ability to endure long investment return periods.

- **Supply Chain Barrier:** Gaining market entry is heavily constrained by the need to integrate into complex and entrenched industrial ecosystems. Established manufacturers have spent years cultivating relationships with reliable suppliers of critical raw materials and high-quality sub-components. They are also deeply embedded in the procurement networks of key downstream sectors such as agriculture, construction, and automotive. A new entrant has to not only secure stable access to these often capacity-constrained supply resources, but also invest years on building trust and proving reliability to potential customers.

- **Talent Barrier:** A critical barrier is the acute scarcity of highly specialized and inter-disciplinary talents. The industry requires a combination of skills, ranging from mechanical design, system modelling, to commercial and lifecycle expertise. These talents are predominantly concentrated within existing industry leaders. Also, it takes time for new entrants to obtain institutional knowledge of industry standards, certification, and customer operational paradigms, making it challenging for them to enter the market and expand within a short period of time.

SOURCES OF INFORMATION

We engaged F&S, an independent market research consultant, to conduct an analysis of, and to prepare a report on the global and China's power transmission systems and machinery industry for use in this Document, which was commissioned by us for a fee of RMB550,000. Frost & Sullivan is an independent global consultancy established in New York in 1961, providing industry research and market strategy services. In compiling and preparing the F&S Report, F&S adopted the following assumptions: (i) the social, economic and political conditions in China currently discussed will remain stable during the forecast period, (ii) China's policies on the off-highway power transmission systems and machinery industry will remain consistent during the forecast period, (iii) China's off-highway power transmission systems and machinery industry will be driven by the factors that are stated in the report in the forecast period. Except as otherwise noted, all of the data and forecasts contained in this section are derived from the F&S Report. The F&S Report has been prepared by F&S independently without any influence from us or other interested parties. Our directors confirm that, to the best of their knowledge, after making reasonable inquiries, there is no material and adverse change in the market information since the date of the F&S Report, which may qualify, contradict or have an impact on the information in this section.