# INDUSTRY OVERVIEW

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## SOURCE OF INDUSTRY INFORMATION

In connection with the [REDACTED], we have engaged Frost & Sullivan, an independent market research consultant, to conduct a detailed analysis on Global and China's sensor and actuator market and prepare a report for use in this document, for which we have agreed to pay an engagement fee of RMB600,000, which we believe to be consistent with market rates.

In compiling and preparing the Frost & Sullivan Report, Frost & Sullivan adopted the following assumptions: (I) global social, economic and political environment is likely to remain stable in the period of 2025 to 2030 (the "forecast period"); (ii) purchasing power is expected to continue to rise moderately in emerging regions and to grow steadily in developed regions; and (iii) related industry key drivers are likely to drive the market 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. Frost & Sullivan has prepared the Frost & Sullivan Report based on detailed primary research which involved discussing the status of the Global and China's sensor and actuator market with certain leading industry participants and secondary research which involved reviewing company reports, independent research reports and data based on its own research database. Our Directors confirm that, after taking reasonable care, there has been no material adverse change in the overall market information since the date of the Frost & Sullivan Report that would materially qualify, contradict or have an impact on such information.

## OVERVIEW OF GLOBAL AND CHINA'S SENSOR AND ACTUATOR MARKET

### Definition

**Sensor** refers to a device or component that detects, measures, and responds to physical, chemical, or biological stimuli from the surrounding environment and converts them into electrical signals that can be processed, displayed, or transmitted. **Actuator** refers to a device that receives control signals and drives mechanical components to perform physical operations based on commands from the control system.

### Value Chain Analysis of Sensor and Actuator Market

The value chain of the sensor and actuator industry consists of three key parts. At the up-stream are raw material suppliers, electronic component suppliers and software & IP core suppliers. The midstream segment is the main body of the industry chain, responsible for transforming upstream raw materials into specific products through designing, manufacturing, packaging and test. The downstream sector is where the value of sensors and actuators is realised and ultimately across multiple industries.

- ***Up-stream: Basic Materials & Core Components***

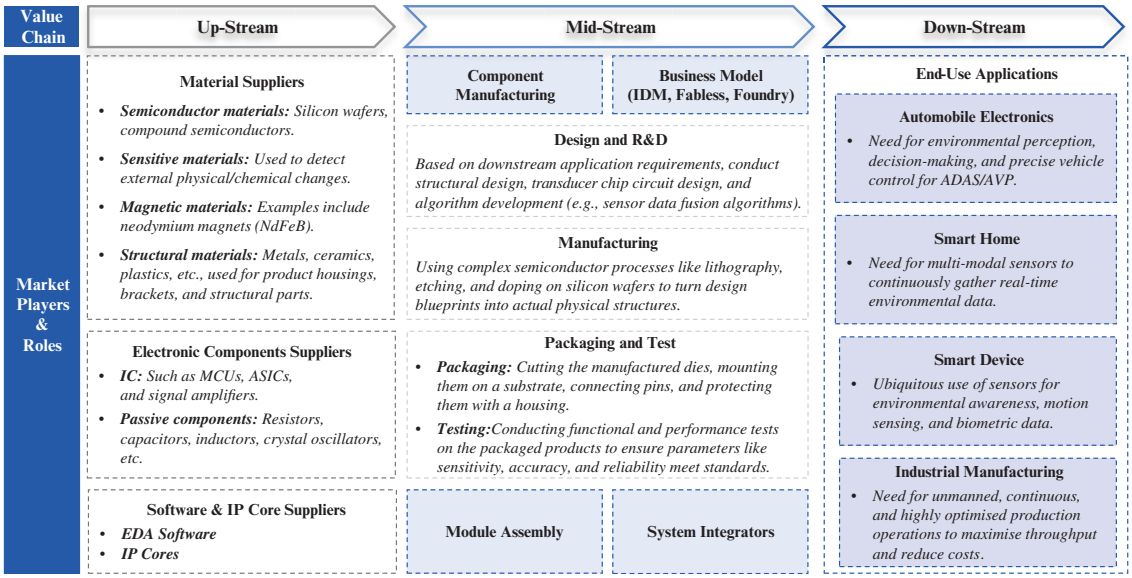
The core value of upstream participants lies in forming the technological backbone of the sensor and actuator industry. These participants deliver the fundamental materials, circuits, and embedded algorithms that define product performance, precision, and intelligence.

- ***Mid-stream: Component Manufacturers, Module Producers, and System Integrators***

In the midstream segment, component manufacturers act as the industry's core technology suppliers, responsible for the R&D and fabrication of essential sensing transducer chips and actuation transducer chips under different business models (IDM, Fabless, and Foundry).

- ***Down-stream: End-Use Applications***

The downstream segment of the sensor and actuator industry spans diverse application fields, including automobile, smart home, smart devices, industrial manufacturing, medical electronics, and network communication.




*Source: Frost & Sullivan Analysis*

**Market Size of Global and China's Sensor and Actuator Market**

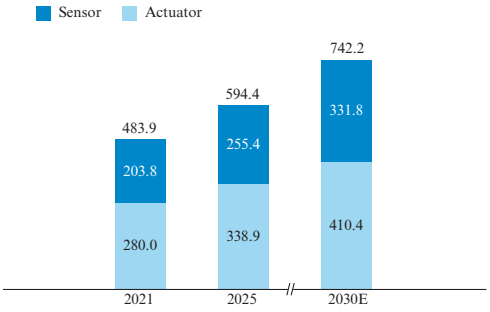
The global and China's sensor markets have shown consistent growth, expanding from approximately USD203.8 billion and RMB317.9 billion in 2021 to approximately USD255.4 billion and RMB437.3 billion in 2025, representing CAGRs of about 5.8% and 8.3%, respectively. During the same period, the global and China's actuator markets grew from approximately USD280.0 billion and RMB421.2 billion to approximately USD338.9 billion and RMB533.7 billion, representing CAGRs of approximately 4.9% and 6.1%, respectively.

Looking ahead, rising demand for intelligent perception and precise motion control fuels the shift toward higher-performance, miniaturised, and software-enhanced sensors and actuators. Both the global and China's sensor and actuator markets are expected to sustain steady growth, with projected CAGRs of around 4.5% and 5.6% from 2025 to 2030, reaching roughly USD742.2 billion and RMB1,277.7 billion, respectively by 2030.

**Sensor and Actuator Market, Global**

USD Billion; 2021–2030E

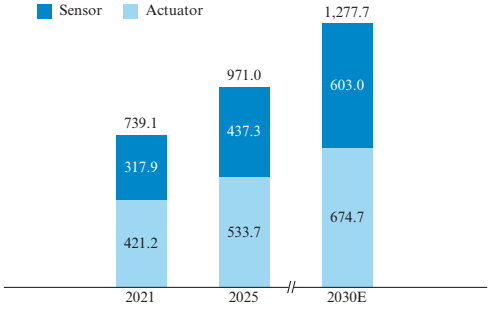
| CAGR | Total | Sensor | Actuator |
|---|---|---|---|
| **2021–2025** | 5.3% | 5.8% | 4.9% |
| **2025–2030E** | 4.5% | 5.4% | 3.9% |




**Sensor and Actuator Market, China**

RMB Billion; 2021–2030E

| CAGR | Total | Sensor | Actuator |
|---|---|---|---|
| **2021–2025** | 7.1% | 8.3% | 6.1% |
| **2025–2030E** | 5.6% | 6.6% | 4.8% |




*Note:* The market size refers to the total sales revenue of sensors and actuators.

*Source:* *Expert Interview, Annual Report of Listed Company, Frost & Sullivan Analysis and Estimates*

**Market for Sensors and Actuators in Smart Home Sector**

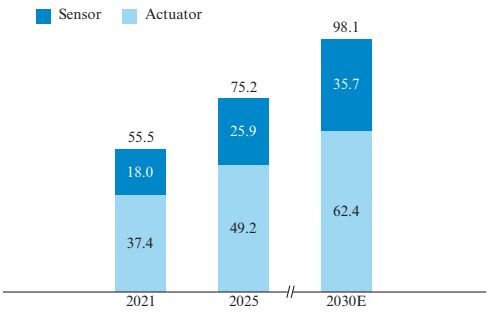
According to the national standard General Technical Requirements for Control Equipment of Smart Home (GB/T 35136–2024), a smart home system refers to a residential management system that is built upon home automation technologies and integrates household devices through artificial intelligence (AI), integrated wiring, the Internet of Things (IoT), and security technologies. Such system is designed to support self-learning capabilities in managing residential facilities and household routines, thereby enhancing safety, convenience and comfort, while enabling the automatic regulation of the living environment.

In 2025, the global markets of sensors for smart home products and actuators for smart home products are valued at approximately USD25.9 billion and USD49.2 billion, respectively. The scale in China is equally significant, with the corresponding markets reaching approximately RMB53.8 billion and RMB96.8 billion, respectively, in the same year. Driven by the continuous integration of intelligent functions into residential environments, as well as technological advancements in IoT connectivity, energy efficiency, and user-centric automation, the global and China's markets of sensors and actuators for smart home products are projected to reach approximately USD98.1 billion and RMB218.3 billion by 2030, growing at estimated CAGRs of approximately 5.5% and 7.7%, respectively, between 2025 and 2030.

**Market for Sensors and Actuators in Smart Home Sector, Global**

USD Billion; 2021–2030E

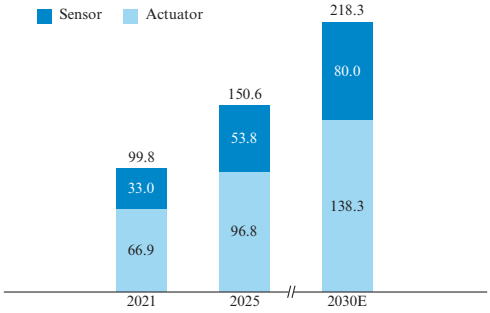
| CAGR | Total | Sensor | Actuator |
|---|---|---|---|
| 2021–2025 | 7.9% | 9.5% | 7.1% |
| 2025–2030E | 5.5% | 6.6% | 4.9% |




**Market for Sensors and Actuators in Smart Home Sector, China**

RMB Billion; 2021–2030E

| CAGR | Total | Sensor | Actuator |
|---|---|---|---|
| 2021–2025 | 10.8% | 13.0% | 9.7% |
| 2025–2030E | 7.7% | 8.3% | 7.4% |




*Note:* The market size refers to the total sales revenue of sensors and actuators used for smart home products.

*Source:* *China Smart Home Industry Alliance, Expert Interview, Annual Report of Listed Company, Frost & Sullivan Analysis and Estimate*

**Market for Sensors and Actuators in Automobile Sector**

According to the national standard Intelligent and Connected Vehicle — Terms and Definitions (GB/T 44373–2024), a smart automobile refers to an automobile equipped with capabilities such as environmental perception, intelligent decision-making, and automated control, enabling it to sense its surroundings, make driving-related decisions, and execute vehicle control functions autonomously.

Sensors and actuators are fundamental components in modern vehicles, enabling core functions ranging from powertrain management and vehicle safety to passenger comfort. Pressure, temperature, and flow sensors enable precise control of engine and braking systems, while position and acceleration sensors monitor real-time vehicle dynamics. Externally, ultrasonic sensors, cameras, LiDAR, and millimetre-wave radar provide comprehensive environmental awareness, supplying critical data for advanced driver-assistance systems (ADAS) to support object recognition and collision avoidance.

In 2025, the global markets of sensors used in automobiles and actuators used in automobiles reached approximately USD49.7 billion and USD42.9 billion, respectively, reflecting CAGRs of approximately 6.5% and 4.3% from 2021 to 2025. In the same year, China's markets of sensors used in automobiles and actuators used in automobiles reached approximately RMB100.7 billion and RMB92.6 billion, respectively, with corresponding CAGRs of approximately 12.0% and 6.6% from 2021 to 2025.

The global and China's automobile markets have undergone a significant shift, with growth now primarily driven by the new energy vehicle (NEV) segment. From 2021 to 2025, global NEV sales grew at a CAGR of approximately 36.0%, while sales in China grew at a CAGR of approximately 47.1%, highlighting the segment's role as the primary engine of industry expansion. As a result, global and China's markets of sensors and actuators in automobile sector are forecast to reach approximately USD115.8 billion and RMB263.4 billion by 2030, respectively.

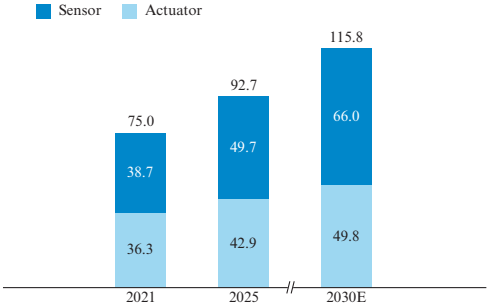
Among the diverse types of sensors used in automobile, ultrasonic sensors serve a highly specialised and indispensable role. They are primarily employed for short-range object detection and distance measurement, making them essential for low-speed manoeuvring applications such as parking assistance and automated parking systems. In these scenarios, they provide accurate proximity feedback to obstacles. In 2025, the global and China's markets for automobile ultrasonic

sensors reached approximately USD8.4 billion and RMB15.7 billion, respectively, yielding CAGRs of approximately 15.2% and 16.3% between 2021 and 2025, respectively. By 2030, the figures are projected to reach approximately USD12.9 billion and RMB25.9 billion, respectively.

**Market for Sensors and Actuators in Automobile Sector, Global**

USD Billion; 2021–2030E

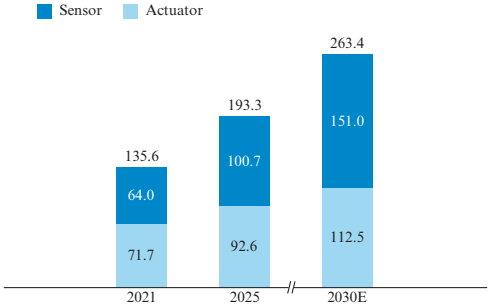
| CAGR | Total | Sensor | Actuator |
|---|---|---|---|
| **2021–2025** | 5.4% | 6.5% | 4.3% |
| **2025–2030E** | 4.6% | 5.8% | 3.0% |




**Market for Sensors and Actuators in Automobile Sector, China**

RMB Billion; 2021–2030E

| CAGR | Total | Sensor | Actuator |
|---|---|---|---|
| **2021–2025** | 9.3% | 12.0% | 6.6% |
| **2025–2030E** | 6.4% | 8.4% | 4.0% |




*Note:* The market size refers to the total sales revenue of sensors and actuators used for automobile.

*Source:* *International Organization of Motor Vehicle Manufacturers, China Association of Automobile Manufacturers, Expert Interview, Annual Report of Listed Company, Frost & Sullivan Analysis and Estimate*

**Market for Sensors and Actuators in Smart Device Sector**

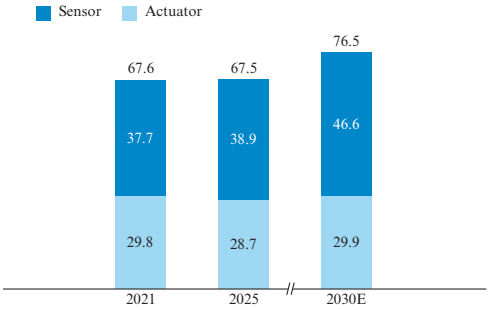
According to the national standard Technical Requirement for Smart Terminal Software Platform (GB/T 34980.2–2017), a smart device refers to an embedded computer system in which the operating system component and application software component are clearly separable, and which allows dynamic configuration of the operating system as well as the addition or removal of application software.

Sensors and actuators serve as fundamental enabling technologies in smart devices including mobile phones, tablets, desktops, PCs and consumer electronics. Sensors continuously monitor both the device's internal state and the external environment, collecting data on factors. Actuators, in turn, execute physical responses based on this data. Between 2021 and 2025, the smart device market experienced fluctuations due to pandemic-related supply-demand imbalances, macroeconomic pressures, and slower innovation cycles. Looking ahead, the market is expected to recover, driven by AI-enabled product upgrades, expanding application scenarios, and a gradual macroeconomic rebound. From 2025 to 2030, the global and China's markets of sensors and actuators for smart devices are projected to grow at CAGRs of approximately 2.5% and 4.4%, respectively, reaching approximately USD76.5 billion and RMB125.2 billion by 2030.

**Market for Sensors and Actuators in Smart Device Sector, Global**

USD Billion; 2021–2030E

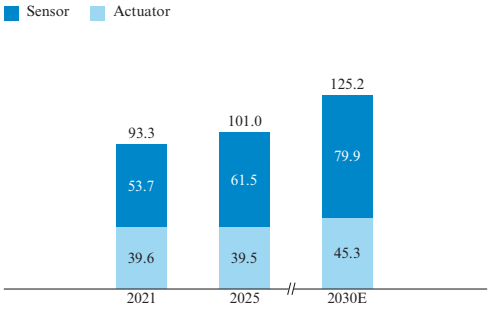
| CAGR | Total | Sensor | Actuator |
|---|---|---|---|
| **2021–2025** | 0.0% | 0.7% | –1.0% |
| **2025–2030E** | 2.5% | 3.7% | 0.8% |




**Market for Sensors and Actuators in Smart Device Sector, China**

RMB Billion; 2021–2030E

| CAGR | Total | Sensor | Actuator |
|---|---|---|---|
| **2021–2025** | 2.0% | 3.4% | 0.0% |
| **2025–2030E** | 4.4% | 5.4% | 2.7% |




*Note:* The market size refers to the total sales revenue of sensors and actuators used for smart devices which include mobile phones, tablets, desktops, PCs and consumer electronics.

*Source:* *Expert Interview, Annual Report of Listed Company, Frost & Sullivan Analysis and Estimate*

### Market for Sensors and Actuators in Industrial Manufacturing

According to the national standard Intelligent Manufacturing — System Architecture (GB/T 40647–2021), smart manufacturing refers to a new manufacturing paradigm that integrates and intelligently utilises processes and resources across cyberspace and physical space, spanning all stages of design, production, logistics, sales, and services. It is characterised by capabilities such as self-perception, self-decision-making, self-execution, self-learning, and self-optimisation, thereby enabling the creation and delivery of products and services in a more adaptive and efficient manner.

Intelligent upgrading in the industrial manufacturing sector is primarily driven by the advancement of industrial automation, smart production lines, predictive maintenance, and the Industrial Internet of Things (IIoT). Smart factories depend on continuous monitoring of equipment status, process parameters, and production rhythms, combined with automated execution systems to achieve precision adjustment and operational optimisation. In this context, sensors collect real-time operational and process data, while actuators enable motion control, parameter regulation, and closed-loop execution. Therefore, sensors and actuators form the core feedback and execution foundation of intelligent manufacturing systems and represent key enabling components supporting the industry's transition toward higher precision, reliability, and automation.

## COMPETITIVE LANDSCAPE OVERVIEW

### Competitive Landscape of China Sensor Supplier

In 2025, Our Company ranked 21st and sixth among China players in terms of the global revenue and global shipment volume of sensors with approximately RMB573.3 million and 87.0 million, representing market shares of approximately 0.03% and 0.1%, respectively.

The tables below sets forth the top five China sensor suppliers in terms of the global revenue and shipment volume of sensors in 2025.

**Ranking of the Leading Sensor Suppliers, China[(1)], 2025**

by Global Revenue of Sensors, RMB Million

| Ranking | Company | Global Revenue of Sensors | Market Share[(2)] |
|---|---|---|---|
| 1 | Company A[(4)] | 21,246.0 | 1.2% |
| 2 | Company B[(5)] | 13,290.0 | 0.8% |
| 3 | Company C[(6)] | 9,031.2 | 0.5% |
| 4 | Company D[(7)] | 6,335.5 | 0.4% |
| 5 | Company E[(8)] | 5,428.2 | 0.3% |
| **Top 5** | | **55,330.9** | **3.2%** |

by Global Shipment Volume of Sensors, Million

| Ranking | Company | Global Shipment Volume of Sensors | Market Share [(3)] |
|---|---|---|---|
| 1 | Company E[(8)] | 2,523.5 | 3.3% |
| 2 | Company F[(9)] | 1,163.9 | 1.5% |
| 3 | Company B[(5)] | 642.2 | 0.8% |
| 4 | Company G[(10)] | 355.8 | 0.5% |
| 5 | Company H[(11)] | 245.0 | 0.3% |
| **Top 5** | | **4,930.5** | **6.5%** |

*Notes:*

(1) The ranking is based on the global revenue and shipment volume of sensors by China companies.

(2) Denominator of the percentage is the global revenue of sensors. In 2025, the global revenue of sensors is approximately RMB1,749.3 billion (USD255.4 billion).

(3) Denominator of the percentage is the global shipment volume of sensors. In 2025, the global shipment volume of sensors is approximately 75.7 billion.

(4) Company A is a company listed on Shanghai Stock Exchange and headquartered in Shanghai. Established in 2007, it principally engaged in the R&D and design of CMOS image sensors, with a product portfolio covering CIS, Touch & Display drivers, and analog solutions. It sells its products to global automobile, smartphone, and security manufacturers. The company's revenue is predominantly generated from the overseas market, accounting for approximately 80.0% in 2025.

(5) Company B is a company listed on Shenzhen Stock Exchange and headquartered in Shenzhen, Guangdong Province. Established in 2001, it has deep expertise in the optical and optoelectronic field, operating three major business segments: smartphones, smart automobiles and emerging applications, and provides customers with one-stop optical and optoelectronic product technology services. The company derives the majority of its revenue from the domestic market, accounting for over 87.0% of total revenue in 2025.

(6) Company C is a company listed on Shanghai Stock Exchange. Established in 2017 and headquartered in Shanghai, the company is principally engaged in the R&D and design of high-performance CMOS image sensor chips, with a product portfolio covering automobile, security, and machine vision CIS. It serves global tier-1 automobile suppliers and smart device manufacturers. In 2025, approximately 43.0% of the company's revenue was derived from overseas market.

(7) Company D is a company listed on Shanghai Stock Exchange and headquartered in Shanghai. Established in 2003, the company is principally engaged in the R&D, design, and manufacturing of CMOS image sensors and display driver chips, with a product portfolio covering mobile and automobile CIS. It primarily serves global smartphone brands and consumer electronics manufacturers. In 2025, over 60.0% of the company's revenue was derived from domestic market.

(8) Company E is a company focused on microelectronics business and headquartered in Qingdao, Shandong Province. Established in 2017, it is engaged in the research and development, production, and sales of sensors, sensor interaction modules, and SiPs. Its products are widely used in consumer electronics, automobile electronics, smart homes, industrial applications, and medical and health fields. In 2025, over 75.0% of the company's revenue was derived from domestic market.

(9) Company F is a company listed on Shanghai Stock Exchange and headquartered in Suzhou, Jiangsu Province. Established in 2007, it has the ability to design and manufacture multiple categories of MEMS chips, possesses independent research and development capabilities and core technologies, and has achieved the localisation of the entire production process of MEMS sensors. Its main product lines include MEMS acoustic sensors, MEMS pressure sensors, and MEMS inertial sensors. Its smart home related products are used in televisions, remote controls, smart door locks, home monitoring, smart beds, etc., and have formed cooperative relationships with companies. The company's revenue is predominantly generated from the domestic market, with overseas revenue accounting for less than 5.0% in 2025.

(10) Company G is a company listed on Shenzhen Stock Exchange and headquartered in Nanyang, Henan Province. Established in 2005, it is an integrated supplier of specialised sensors and solutions, engaging in R&D, design, production, sales, and service. Its core product portfolio includes pyroelectric infrared sensors, visible light sensors, flame sensors, micro-differential pressure sensors, and related solutions. The company has further expanded its offerings to include flame and gas detectors, gas alarm controllers, smart sensors, and related supporting products. Additionally, it possesses the capability to deliver integrated safety monitoring products and systems tailored to the needs of major downstream clients. The company's revenue is predominantly generated from the domestic market, with overseas revenue accounting for approximately 4.2% in 2025.

(11) Company H is a company listed on Shanghai Stock Exchange and headquartered in Beijing. Established in 2005, it is a fabless chip supplier mainly engaged in the R&D, technical support, and sales of memory, MCUs, and sensors. Its sensor business covers man-machine interaction fields such as mobile phones, tablets, and smart homes, providing smaller embedded capacitor solutions for smart door locks. It has established branches and offices in multiple countries and regions including Hong Kong, Hsinchu, Singapore, and the United States. The company's revenue is predominantly generated from the overseas market, accounting for approximately 70.0% in 2025.

China suppliers of sensor for smart home products operate within a fragmented landscape. Different scenarios, shows significant differences in their requirements for sensor accuracy, power consumption, and form factor, leading various manufacturers to respond to distinct segmented needs, and exacerbating market fragmentation. In 2025, Our Company ranked first and fifth among China players in terms of the global revenue and global shipment volume of sensors for smart home products with approximately RMB287.2 million and 28.8 million, representing market shares of approximately 0.2% and 0.3%, respectively.

The tables below sets forth the top five China sensor suppliers in terms of the global revenue and shipment volume of sensors for smart home products in 2025.

**Ranking of the Leading Sensor Suppliers for Smart Home Products, China[12], 2025**

by Global Revenue of Sensors for Smart Home Products, RMB Million

| Ranking | Company | Global Revenue of Sensors for Smart Home Products | Market Share[13] |
|---|---|---|---|
| **1** | **Our Company** | **287.2** | **0.2%** |
| 2 | Company B[5] | 265.8 | 0.1% |
| 3 | Company I[15] | 212.1 | 0.1% |
| 4 | Company J[16] | 207.1 | 0.1% |
| 5 | Company K[17] | 188.7 | 0.1% |
| **Top 5** | | **1,160.9** | **0.7%** |

by Global Shipment Volume of Sensors for Smart Home Products, Million

| Ranking | Company | Global Shipment Volume of Sensors for Smart Home Products | Market Share[14] |
|---|---|---|---|
| 1 | Company G[10] | 249.1 | 2.4% |
| 2 | Company F[9] | 174.6 | 1.7% |
| 3 | Company H[11] | 61.2 | 0.6% |
| 4 | Company E[8] | 50.5 | 0.5% |
| **5** | **Our Company** | **28.8** | **0.3%** |
| **Top 5** | | **564.2** | **5.3%** |

*Notes:*

(12) The ranking is based on the global revenue and shipment volume of sensors for smart home products by China companies.

(13) Denominator of the percentage is the global revenue of sensors for smart home products. In 2025, the global revenue of sensors for smart home products is approximately RMB177.5 billion (USD25.9 billion).

(14) Denominator of the percentage is the global shipment volume of sensors for smart home products. In 2025, the global shipment volume of sensors for smart home products is approximately 10.5 billion.

(15) Company I is a company listed on Shanghai Stock Exchange and headquartered in Wuhan, Hubei Province. Established in 2003, it is a technology company specialising in the research, development, production, and sales of gas sensors and gas analysis instruments. It has established two major industrial ecosystems encompassing gas sensors and high-end gas analysis instruments, offering over a hundred product varieties. In 2025, approximately 30.7% of the company's revenue came from overseas.

(16) Company J is a company listed on Shenzhen Stock Exchange and headquartered in Shenzhen, Guangdong Province. Established in 2004, it is a technology company sepcialising in the R&D, manufacturing and sale of smart sensors, with product portfolio covering temperature sensors, pressure sensors and ceramic pressure sensors, offering smart sensors to global automobile and home appliance manufacturers. The company derives the majority of its revenue from the domestic market, accounting for over 85.0% of total revenue in 2025.

(17) Company K is a company listed on Shenzhen Stock Exchange and headquartered in Weifang, Shandong Province. Established in 2001, it is a technology company specialising in electro-acoustic components and modules, as well as a solutions provider for electro-acoustic technologies. Its main products include MEMS acoustic sensors, Electret Condenser Microphones (ECM), in-vehicle voice modules, and related products. In 2025, approximately 35.0% of the company's revenue came from overseas.

China's automobile sensor suppliers operate within a highly fragmented landscape. Automobiles require a wide range of products based on diverse principles and types. Different manufacturers specialise in intensive R&D and production in areas such as pressure, temperature, and distance sensing, which has increased the fragmentation of suppliers. Furthermore, with the development of new energy vehicles (NEVs) and intelligent driving functions, the technical routes for automobile-related products have gradually diversified and formed rapid iterations, making it difficult for a single manufacturer to cover the full range of products. In 2025, Our Company ranked 12th and fourth among China players in terms of the global revenue and global shipment volume of automobile sensors with approximately RMB279.4 million and 55.2 million, representing market shares of approximately 0.1% and 0.6%, respectively. In the automobile actuator market, the combined global revenue of automobile actuators of the top five China automobile actuator suppliers accounted for approximately 15.1% of the global automobile actuator market in 2025. Against this backdrop, Our Company generated approximately RMB7.7 million in global revenue of automobile actuators, representing a market share of less than 0.01% in 2025.

The tables below sets forth the top five China sensor suppliers in terms of the global revenue and shipment volume of automobile sensors in 2025.

**Ranking of the Leading Automobile Sensor Suppliers, China[(18)], 2025**

by Global Revenue of Automobile Sensors, RMB Million

| Ranking | Company | Global Revenue of Automobile Sensors | Market Share[(19)] |
|---|---|---|---|
| 1 | Company L[(21)] | 3,503.4 | 1.0% |
| 2 | Company B[(5)] | 2,742.7 | 0.8% |
| 3 | Company M[(22)] | 2,378.6 | 0.7% |
| 4 | Company N[(23)] | 1,780.1 | 0.5% |
| 5 | Company O[(24)] | 1,660.7 | 0.5% |
| **Top 5** | | **12,065.6** | **3.5%** |

by Global Shipment Volume of Automobile Sensors, Million

| Ranking | Company | Global Shipment Volume of Automobile Sensors | Market Share[(20)] |
|---|---|---|---|
| 1 | Company E[(8)] | 126.2 | 1.5% |
| 2 | Company B[(5)] | 79.5 | 0.9% |
| 3 | Company L[(21)] | 56.4 | 0.7% |
| **4** | **Our Company** | **55.2** | **0.6%** |
| 5 | Company O[(24)] | 48.3 | 0.6% |
| **Top 5** | | **365.5** | **4.2%** |

*Notes:*

(18) The ranking is based on the global revenue and shipment volume of automobile sensors by China companies.

(19) Denominator of the percentage is the global revenue of automobile sensors. In 2025, the global revenue of automobile sensors is approximately RMB340.5 billion (USD49.7 billion).

(20) Denominator of the percentage is the global shipment volume of automobile sensors. In 2025, the global shipment volume of automobile sensors is approximately 8.7 billion.

(21) Company L is a company listed on Shenzhen Stock Exchange and headquartered in Wuhan, Hubei Province. Established in 1999, it focuses on laser technology and its applications, and is anchored in new energy vehicles and digital empowerment. It has formed three major business patterns: intelligent manufacturing equipment business supported by laser processing technology, optical and wireless connection business supported by information and communication technology, and sensor business supported by sensitive electronic technology. The company derives the majority of its revenue from the domestic market, accounting for over 85.0% of total revenue in 2025.

(22) Company M is a company listed on Hongkong Stock Exchange and headquartered in Shanghai. Established in 2014, it is a leading company in the research, development, and manufacturing of lidar. Its products are widely applied in passenger and commercial vehicles equipped with Advanced Driver Assistance Systems (ADAS), as well as in autonomous vehicles and various robotic applications such as delivery robots and mobile robots. With a global business footprint, the company generated over 20.0% of its revenue from overseas markets in 2025.

(23) Company N is a company listed on Shenzhen Stock Exchange and headquartered in Shenzhen, Guangdong Province. Established in 2010, it engaged in the R&D and manufacturing of automobile intelligent driving perception systems, with a product portfolio covering in-vehicle camera systems, ultrasonic sensing systems and millimeter-wave radar. In 2025, more than 30.0% of the company's revenue was derived from overseas market.

(24) Company O is a company listed on Shenzhen Stock Exchange and headquartered in Beijing. Established in 1999, it currently employs over 170,000 professionals and is primarily engaged in the design, development, and sales of aerospace products such as launch vehicles, various types of satellites, manned spacecraft, cargo spacecraft, deep-space probes, and space stations, as well as weaponry products including strategic missiles, tactical missiles, and unmanned systems. In 2025, more than 65.0% of the company's revenue was derived from overseas market.

Global automobile ultrasonic sensor and actuator suppliers operate within a concentrated landscape. This market structure is driven by the following factors. Firstly, leading enterprises participate in formulating the industry standards for automobile-grade sensors and actuators, consolidating their technological discourse power in the sector. Meanwhile, these suppliers have also established technological barriers through their patent portfolios. In addition, automobile-grade products are subject to overall stringent certification requirements, and OEMs have already built long-term and stable supplier networks. Furthermore, leading enterprises boast outstanding mass production capabilities and integration capabilities across the industrial chain. Amid the trend of product intelligence and premiumisation, top suppliers have gained more customers and corresponding market share by virtue of their superior product performance. In 2025, the global shipment volume of automobile ultrasonic sensors and actuators of top five global players reached approximately 538.8 million and Our Company ranked third with approximately 61.1 million, representing a market share of approximately 11.3%.

The tables below sets forth the top five global automobile ultrasonic sensors and actuators suppliers in terms of the global shipment volume of automobile ultrasonic sensors and actuators in 2025.

**Ranking of the Leading Automobile Ultrasonic Sensor & Actuator Suppliers, Global[(25)], 2025**

by Global Shipment Volume of Automobile Ultrasonic Sensors & Actuators, Million

| Ranking | Company | Global Shipment Volume of Automobile Ultrasonic Sensors & Actuators | Market Share[(26)] |
|---|---|---|---|
| 1 | Company P[(27)] | 106.4 | 19.7% |
| 2 | Company Q[(28)] | 97.8 | 18.1% |
| **3** | **Our Company** | **61.1** | **11.3%** |
| 4 | Company R[(29)] | 29.3 | 5.4% |
| 5 | Company S[(30)] | 15.5 | 2.9% |
| **Top 5** | | **310.1** | **57.6%** |

*Notes:*

(25) The ranking is based on the global shipment volume of automobile ultrasonic sensors and actuators by global companies.

(26) Denominator of the percentage is the global shipment volume of automobile ultrasonic sensors and actuators. In 2025, the global shipment volume of automobile ultrasonic sensors and actuators is approximately 538.8 million.

(27) Company P is a company established in 1886 and it is headquartered in Gerlingen, Germany. It is a global supplier of technology and services. Its operations are divided into four business sectors: Mobility, Industrial Technology, Consumer Goods, and Energy and Building Technology. It aims to form influence within universal trends such as automation, electrification, digitalisation, connectivity, and an orientation to sustainability. It provides sensor technology, software, and services to offer customers cross-domain solutions. As of December 31, 2025, it employs over 410,000 associates worldwide.

(28) Company Q is a company established in 1923 and it is headquartered in Paris, France. It is a technology company and partner to automakers and new mobility players in 28 countries worldwide. It has outstanding performance in technological and industrial including electrification, driving assistance systems, reinvention of the interior experience and lighting. It also provides and distributes spare parts for automakers and independent aftermarket operators. As of December 31, 2025, it employs over 106,000 employees and owns 155 production sites worldwide.

(29) Company R is a company established in 1944 and it is headquartered in Kyoto, Japan. It is a company focused on the electronic components business. It is primarily engaged in the R&D, production, and sale of electronic components based on functional ceramic technology. Its products and solutions primarily serve the communications, automobile electronics, and industrial equipment sectors. As of December 31, 2025, it employs approximately 73,000 employees and operates 85 companies worldwide.

(30) Company S is a company established in 2003 and it is headquartered in Hefei, Anhui Province. It is a technology company engaged in the R&D, production, and sales of critical sensors and systems for vehicle intelligence. Its main product lines comprise the smart driving product unit and the body electronics product unit.

(31) Due to the fact that products of other companies are primarily delivered in the form of integrated smart driving systems, its revenue recognition model differs fundamentally from that of Our Company. Therefore, a direct comparison of revenue scale is unobtainable.

**Competitive Landscape of China Actuator Supplier**

In the overall actuator market, the top five China actuator suppliers recorded combined global actuator revenue representing approximately 3.3% of the global actuator market in 2025. Against this backdrop, the Company generated global actuator revenue of approximately RMB88.6 million, representing a market share of less than 0.01% in 2025.

In the smart home actuator market, the top five China suppliers of actuators for smart home products recorded combined global revenue representing approximately 3.4% of the global smart home actuator market in 2025. Against this backdrop, the Company generated global revenue of approximately RMB76.1 million from actuators for smart home products, representing a market share of approximately 0.02% in 2025.

In the automobile actuator market, the top five China automobile actuator suppliers recorded combined global automobile actuator revenue representing approximately 15.1% of the global automobile actuator market in 2025. Against this backdrop, the Company generated global automobile actuator revenue of approximately RMB7.7 million, representing a market share of less than 0.01% in 2025.

**Growth Drivers of China's Sensor and Actuator Market**

- **Powerful National Policies Fuelling Industry Expansion:** Strategic national policies are the primary catalysts for the rapid expansion of China's sensor and actuator market. The 14th Five-Year Plan highlights sensors as a key focus, urging breakthroughs in fundamental research and industrial application. National initiatives such as "Intelligent Manufacturing and Digital Transformation" and "Made in China 2025" are driving rapid expansion in the smart manufacturing industry, which are generating substantial demand for high-precision components. Besides, financial mechanisms such as the National Integrated Circuit Industry Investment Fund provide critical support for key segments of the industrial chain, encouraging technological innovation, enhancing the localisation rate, and strengthening supply chain security. This cohesive policy framework creates a virtuous cycle, simultaneously stimulating market demand and empowering domestic companies to achieve technological advancement and scale.

- **Miniaturisation, Integration, and Intelligence Drive Evolution:** The development of the sensor and actuator market is increasingly driven by the convergence of three key technological trends: miniaturisation, integration, and intelligence. The push toward miniaturisation allows these components to be embedded into increasingly compact and portable devices without sacrificing performance. Integration further enhances their value by combining multiple sensing or actuating functions into a single module, reducing both system footprint and power consumption. Together, these advancements are expanding the applicability, efficiency, and functionality of sensors and actuators across sectors, thereby accelerating further market growth.

- **Diversified Application Driver Innovation:** The downstream applications is exerting a significant reverse-driving force on the sensor and actuator industry. In sectors such as automobile manufacturing, stringent requirements for safety and reliability compel upstream components to achieve higher levels of precision, durability, and functional safety. Meanwhile, the demand for miniaturisation and energy efficiency in applications like smart home and smart device is accelerating the transition from discrete components to integrated, intelligent modules. These evolving downstream needs are reshaping the technological roadmap of the entire industry.

- **Technological Catalysts for Evolution:** The progression of sensors and actuators is fundamentally driven by technological innovation. Advances in MEMS fabrication and advanced packaging enable higher integration of sensing, computing, and connectivity into increasingly compact and cost-efficient devices. Concurrently, the adoption of edge computing and multi-sensor fusion algorithms elevates these components from passive parts to intelligent units capable of localised decision-making. Furthermore, new materials and sensing principles continue to enhance performance parameters. Collectively, these technical developments are transforming conventional sensors and actuators into intelligent subsystems.

**Future Trends of China's Sensor and Actuator Market**

- **AI-Integrated Intelligence is Next Frontier:** The future trajectory of sensors and actuators will be defined by the depth of embedded artificial intelligence, marking an industry-wide transition from providing raw data to delivering intelligent, decision-making capabilities. As AI integration deepens, these components will evolve into cognitive nodes with dynamic learning and optimisation abilities, meeting escalating demands for reliability and sustained performance across diverse applications.

- **Multi-modal Perception and Higher Hardware Integration:** High integration has become a major technological direction for sensor and actuator. On one hand, the growing adoption of multi-modal perception where multiple sensing functions are integrated within a single device to achieve richer environmental awareness. In addition, the convergence of sensing, algorithms and control units into unified smart modules or chips, forming compact and closed-loop units capable of faster and more reliable responses. Such integrated modules are particularly suited to applications like smart home, smart devices and advanced robotics, where spatial efficiency and integration are critical.

- **From Standardised Components to Customised Solutions:** The sensor and actuator sector is shifting toward solution co-creation with downstream manufactures to meet the specific needs of fields. Upstream sensor and actuator suppliers are evolving from standardised hardware providers to collaborative partners involved in early R&D, jointly defining product specifications and developing customised and plug-and-play solutions. As the industry increasingly emphasise vertical collaboration, the long-term stability and consistency will become key competitiveness. In response, sensor and actuator suppliers are strengthening lifecycle quality management to enhance reliability and traceability.

- **Global Expansion of Chinese Sensor and Actuator Companies:** The overseas expansion of Chinese sensor and actuator companies is increasingly becoming an important future trend for the industry. The ongoing intelligent transformation of manufacturing is driving growing demand for high-reliability smart sensors and precision actuators, presenting structural opportunities for Chinese enterprises. Chinese companies have established advantages in product cost-effectiveness, supply chain responsiveness, and customisation capabilities across stages. More importantly, China provides sensor and actuator firms with vast real-world data and iterative testing environments which constitutes a core differentiating advantage relative to international competitors.

**Entry Barriers of China's Sensor and Actuator Market**

- **Technical Barriers in Manufacturing:** The development and production of high-performance sensors and actuators involve the integration of multiple advanced technologies. Proficiency in any single discipline is insufficient to master the entire manufacturing process. Key manufacturing steps require extensive specialised experience and long-term technical accumulation, which cannot be easily replicated. In addition, varying performance requirements across different application scenarios necessitate the development of customised solutions, along with continuous optimisation based on real-world feedback. New market entrants often lack the practical experience.

- **Long-term Customer Recognition as a Critical Market Barrier:** In the sensor and actuator industry, long-established customer trust and collaborative relationships form a significant soft barrier to entry. As these products are deeply integrated into clients' production processes or end systems, their reliability, stability, and compatibility require extensive long-term field validation. New market entrants must invest substantial time and resources to complete product testing, qualification certifications, and small-batch trial cycles, making it challenging to disrupt the deeply embedded relationships between incumbent suppliers and their customers in the short term.

- **Supply Chain Integration and Cost Control as Key Industry Barriers:** The highly specialised supply chain system in the sensor and actuator industry presents a significant barrier to entry. This sector involves multiple intricate processes, including precision materials, specialised chips, and customised packaging, requiring new entrants to spend years establishing stable supplier relationships and overcoming technical collaboration challenges. Established players, through economies of scale, integration, and process optimisation, have developed structural advantages in cost control, enabling them to maintain competitive pricing while preserving profit margins. The barriers formed by deep supply chain integration and cost efficiency continue to reinforce the industry's existing competitive landscape.

- **Capital and Talent Accumulation as Significant Market Entry Barriers:** The sensor and actuator industry is characterised by dual attributes of capital and knowledge intensity, creating high entry barriers for latecomers. Financially, establishing high-end MEMS production lines and procuring precision testing equipment require a huge amount of investment. In terms of talent, this field demands interdisciplinary teams with expertise spanning semiconductor processes, micro-mechanical design, edge computing algorithms, and other specialised areas, leaving new entrants grappling with talent scarcity, extended training cycles, and high compensation costs.

**Cost of Raw Materials Analysis**

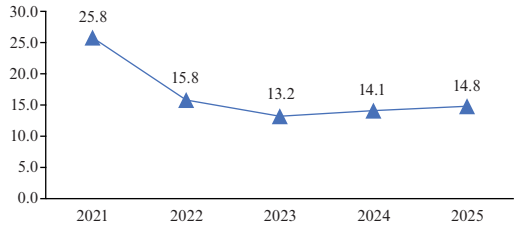
Epoxy resin and acrylonitrile butadiene styrene (ABS), as representative materials in the rubber and plastic material category, went through fluctuations in their prices between 2021 and 2025, ultimately declining from approximately RMB25.8 thousand per tonne and RMB17.5 thousand per tonne in 2021 to approximately RMB14.8 thousand per tonne and RMB10.4 thousand per tonne in 2025.

The prices of metals and electrode materials have experienced an increase over the past few years, with the prices of gold, silver, and copper rising from approximately RMB392.1 per gramme, RMB4,717.1 per kilogramme and RMB67.4 per kilogramme in 2022 to approximately RMB797.7 per gramme, RMB9,739.7 per kilogramme and RMB81.1 per kilogramme, respectively, in 2025. The price of aluminium has remained essentially stable between 2022 and 2025, reaching approximately RMB20.7 per kilogramme in 2025. The price of stainless steel, on the contrary, experienced a relatively significant decline from approximately RMB18.2 per kilogramme in 2022 to approximately RMB13.1 per kilogramme in 2025.

The producer price index (PPI) for electronic components and electronic specialty materials has remained stable in recent years, standing at approximately 98.1 in 2025.

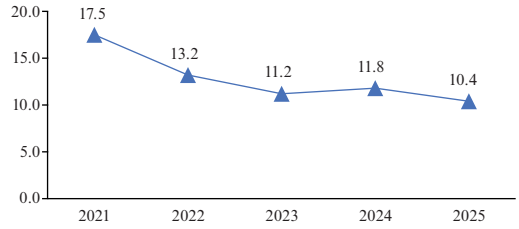
**Average Price of Epoxy Resin**

RMB Thousand/Tonne; 2021–2025



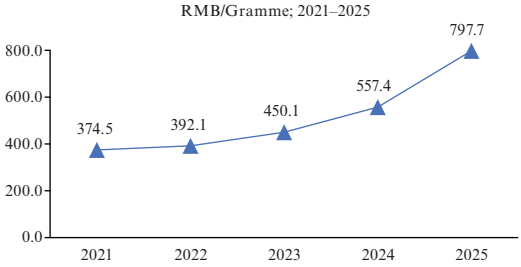

**Average Price of ABS**

RMB Thousand/Tonne; 2021–2025



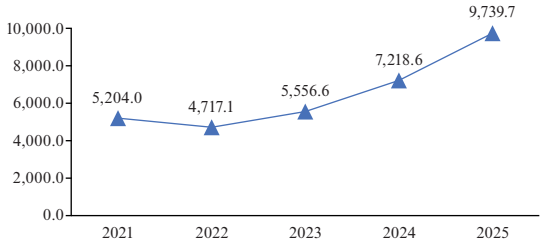

**Average Price of Gold**

RMB/Gramme; 2021–2025



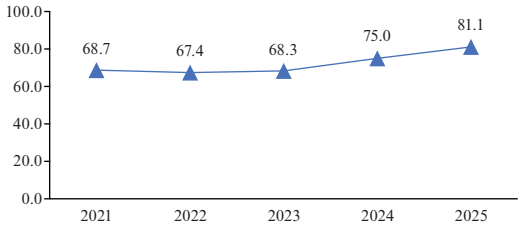

**Average Price of Silver**

RMB/Kilogramme; 2021–2025



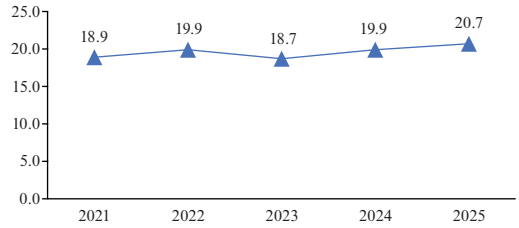

**Average Price of Copper**

RMB/Kilogramme; 2021–2025



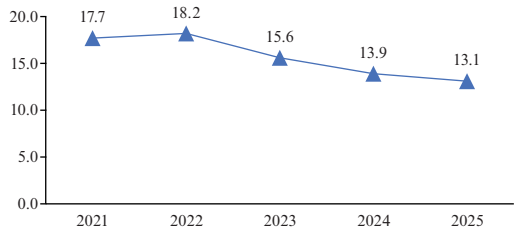

**Average Price of Aluminium**

RMB/Kilogramme; 2021–2025



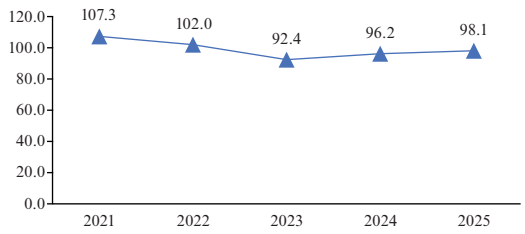

**Average Price of Stainless Steel**

RMB/Kilogramme; 2021–2025




**PPI of Electronic Components and Electronic Specialty Materials**

2021–2025




### Overseas Production Expansion Analysis

In the context of the reshaping supply chain of the global sensor industry, expanding production capacity overseas has become a strategic choice for companies considering the resilient supply chain network, proximity to end markets and cost structure optimisation.

# INDUSTRY OVERVIEW

Malaysia, with its unique geographical and industrial advantages, has emerged as a key destination for companies expanding their overseas production capacities. Capacity expansion by Chinese sensor and actuator manufacturers in Malaysia is an integrated supply-chain and market positioning strategy rather than a simple increase in output. In an environment shaped by geopolitical uncertainty and globally distributed customers, geographic diversification strengthens supply-chain resilience while reducing concentration risk. At the same time, a local production presence enables closer proximity to ASEAN markets, improving delivery efficiency, customization capability, and service responsiveness. These strategic benefits are reinforced by Malaysia's established electronics manufacturing ecosystem, spanning semiconductor packaging, precision components, and assembly clusters, which provides industrial synergies and supplier depth. Coupled with a pro-investment policy framework and Malaysia's function as a regional logistics hub, the country represents a structurally attractive base for long-term overseas manufacturing expansion.