

INDUSTRY OVERVIEW

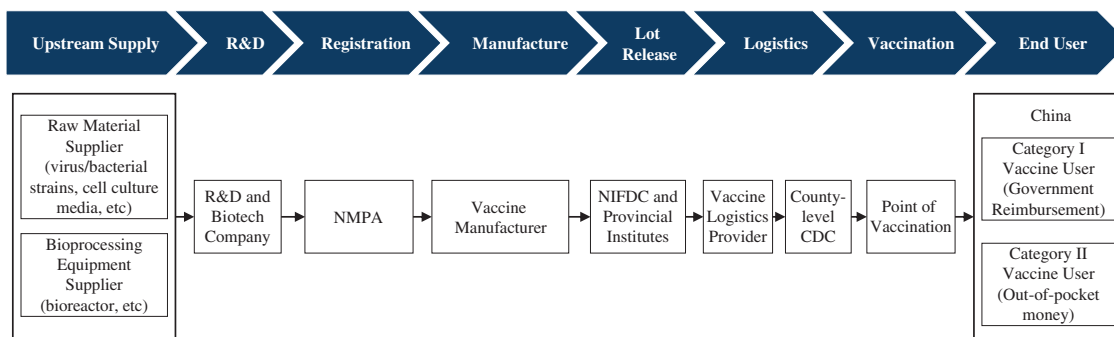
The information and statistics set out in this section and other sections of this document were extracted from different official government publications, available sources from public, market research and other sources from independent suppliers, and from the independent industry report prepared by Frost & Sullivan. 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 Joint Sponsors, the Overall Coordinators, [REDACTED], any of their respective directors and advisors, or any other person or parties involved in the [REDACTED], and no representation is given as to its accuracy. Accordingly, the information from official government sources contained herein may not be accurate and should not be unduly relied upon.

THE HUMAN VACCINE MARKET

Human Vaccine Overview

The human vaccine industry chain incorporates multiple stages, including upstream supply, R&D, registration, manufacture, lot release, logistics, and vaccination, as shown in the graphic below. Each stage involves stringent regulatory, biosafety and quality-assurance requirements.

- The first stage of vaccines industry value chain is the preparation of raw materials, which include primary cell, vero cell, human diploid cell and the serum.
- The virus are grown and cultured during fermentation process, such as the use of bioreactor. After the fermentation process, the cell cultures harvested and purified, and then vaccine manufacturers completed formulation, filling and packaging for vaccines.
- Beyond product registration, vaccines in China must pass lot release approval before commercial supply, making lot release a key quality control gateway.



Note: In the lot release stage, provincial institutes refers to the seven NMPA-designated provincial drug testing institutes for biological products in China.

Source: Frost & Sullivan Analysis

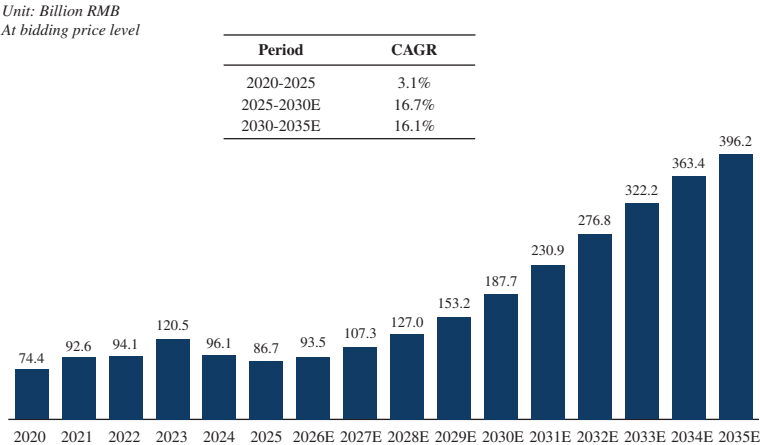
Typically, in these stages, international suppliers provide key inputs, manufacturers conduct antigen production, purification, formulation and packaging under GMP and lot-release controls, logistics providers maintain temperature-controlled distribution, and authorized medical institutions administer vaccines with regulated traceability and safety procedures.

Human vaccines are distinguished by differences in antigen presentation, immune-activation mechanisms and manufacturing processes. Main types of human vaccines include (i) **inactivated vaccines**, which employ whole pathogens that have been chemically or physically inactivated, retaining antigenic properties while eliminating infectivity to safely induce an immune response; (ii) **live attenuated vaccines**, which use weakened forms of live pathogens that can replicate to a

INDUSTRY OVERVIEW

limited extent in the host, thereby eliciting robust and durable immune responses without causing disease under normal conditions; (iii) **polysaccharide vaccines**, which are based on purified surface polysaccharides derived from pathogens and primarily stimulate antibody-mediated immune responses; (iv) **polysaccharide-protein conjugate vaccines**, which chemically link polysaccharide antigens to carrier proteins to convert T-cell-independent responses into T-cell-dependent immunity, enhancing immunogenicity, particularly in infants and young children; (v) **protein-based vaccines**, including recombinant protein subunit vaccines, which use purified native or recombinant protein antigens to induce targeted immune responses with a well-established safety profile; and (vi) other vaccine types, including toxoid vaccines, viral vector vaccines, and nucleic acid vaccines, which utilize diverse antigen delivery or genetic engineering approaches to induce immunity.

China Human Vaccine Production Value, 2020-2035E



Note:

1. The COVID-19 vaccine market has not been considered. 2. The human vaccine market size is lot release based.

Source: NMPA, Frost & Sullivan Analysis

China’s human vaccine market (ex-COVID) increased from RMB74.4 billion in 2020 to RMB86.7 billion in 2025 at a CAGR of 3.1%, after peaking at RMB120.5 billion in 2023. Going forward, the market is projected to reach RMB187.7 billion by 2030 at a CAGR of 16.7% and RMB396.2 billion by 2035 at a CAGR of 16.1%, supported by continued launches of innovative vaccines and accelerating penetration in self-pay segments. The decline in 2024 reflects a normalization following the 2023 catch-up vaccination peak, as delayed immunization demand was largely released in 2023. In addition, a temporary slowdown in high-priced adult vaccines and price adjustments at the ex-factory level contributed to a short-term market correction rather than a structural downturn.

HUMAN RABIES VACCINES

Rabies is a vaccine-preventable viral disease found in over 150 countries and regions that targets the central nervous system, causing progressive and irreversible encephalitis. Transmitted almost exclusively through the saliva of infected animals, the virus travels along nerves to the brain, leading to classic symptoms such as hydrophobia, aerophobia, and paralysis. Once clinical symptoms appear, the disease is nearly 100% fatal, as no effective treatment exists. However, rabies is highly preventable through vaccination, which works by causing the body to produce antibodies against the virus. PrEP offers baseline protection for high-risk individuals, while PEP, which is a combination of wound care, passive immunization, and active vaccination, is highly effective when administered promptly. Modern, safe, and potent cell culture-derived vaccines are widely adopted. Despite these tools, rabies disproportionately impacts developing countries in Asia and Africa, where limited access to timely PEP and ongoing canine rabies accounts for most human deaths, underscoring the critical need for improved vaccine accessibility and affordability worldwide.

INDUSTRY OVERVIEW

Human Rabies Vaccine Overview

Rabies vaccines currently in use are primarily manufactured by either traditional cell line (primary cell and Vero cell) and innovative cell line. Each of them differs in safety profile, production scalability and manufacturing cost: (i) **Primary cell-based vaccines** represent the earliest generation of rabies vaccines. Although cost-effective, primary cells carry a higher risk of contamination and are less suited for large-scale, standardized production. As a result, their competitiveness has declined as newer platforms have become mainstream. (ii) **Vero cell-based vaccines** have become the dominant product class in China and globally due to their strong safety record, stable yields and suitability for industrial-scale manufacturing. Vero cells provide a consistent substrate that reduces process variability, enables serum-free and human serum albumin-free production and supports high-volume supply, making them the preferred choice for national immunization programs and routine clinical use; and (iii) HDC vaccines are usually derived from cell lines established from normal human fetal tissue, including MCR-5, 2BS, EI-38 cell line. These cell lines are well-characterized, highly stable and free from adventitious agents, providing a controlled substrate for viral propagation. Compared with primary cell or Vero-cell substrates, HDC lines more closely mimic human physiological environments, allowing the virus to grow efficiently while minimizing the presence of non-human proteins. As a result, HDC-based rabies vaccines exhibit favorable safety profiles, strong immunogenicity and lower theoretical risk of tumorigenic DNA residues, making them particularly suitable for high-risk exposures and sensitive populations.

The following table shows the main distinguishing factors between the rabies vaccines, including production capacity, safety, winning bid median price and challenges entailed:

Cell Line	Introduction	Production Capacity	Safety	Winning Bid Median Price	Challenges
Traditional Cell Line	Purified Chick Embryo Cell	Capacity limited by the supply and quality of SPF eggs	Egg ingredients may cause allergic reactions	RMB197/vial (≥ 2.5 IU)	- Risk of insufficient supply - Time-consuming
	Primary Cell Baby Hamster Kidney-21	- Good scalability in bioreactors. - Supports high virus yields with consistent performance	- Low risk of allergic reactions compared to egg-based vaccines - Potential concerns about residual host cell DNA	RMB 95/vial (1 mL)	- Control of residual DNA - Consistency in large-scale culture
	Vero Cell Isolated from kidney epithelial cells extracted from an African green monkey	High scalability and stable culture performance	Presence of residual host cell DNA	- Lyophilized: RMB98/vial (1 mL) - Non-lyophilized: RMB 99/vial (1 mL)	Potential tumorigenicity of the DNA of high-passage Vero cells
Innovative Cell Line	Human Diploid Cell - Usually derived from cell lines established from normal human fetal tissue - Mainly includes MCR-5, 2BS, EI-38 cell line	Good expansion ability but difficult to scale up for industrial production	No residual host cell proteins and foreign DNA in vaccines, can reduce adverse reactions	Lyophilized: RMB 313/vial (1 mL)	Stringent requirements for environment, media, and cultivation processes

Note:

* Chick-embryo vaccine price is based on 2022 winning bid (the most recent lot release); Vero cell, human diploid cell, and Baby Hamster Kidney-21 prices are based on 2025 winning bids.

Source: Frost & Sullivan Analysis

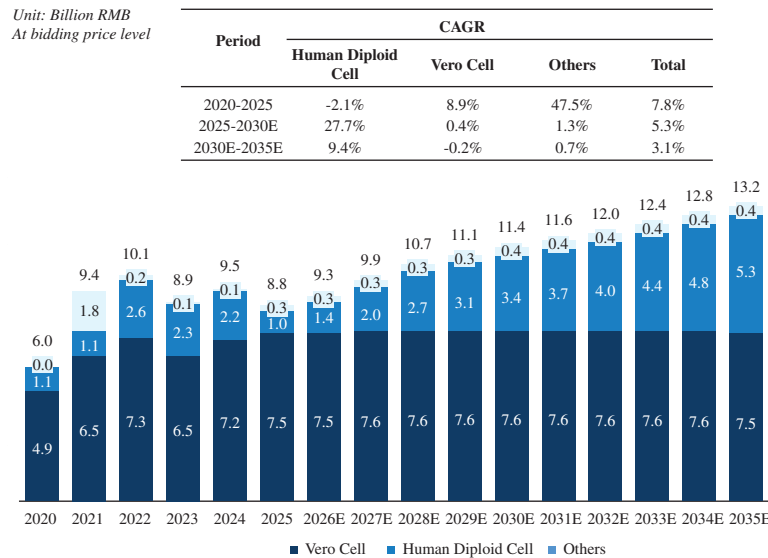
China Human Rabies Vaccine Market

China’s human rabies vaccine market expanded from RMB6.0 billion in 2020 at a CAGR of 7.8% to RMB8.8 billion in 2025 and is expected to increase from 2025 at a CAGR of 5.3% to reach RMB11.4 billion by 2030 and further grow from 2030 at a CAGR of 3.1% to RMB13.2 billion by 2035.

INDUSTRY OVERVIEW

By cell line, Vero-cell vaccines remain the largest value pool, but growth is essentially stagnated, increasing from RMB4.9 billion in 2020 to RMB7.5 billion in 2025, and is expected to reach RMB7.6 billion in 2030 before easing to RMB7.5 billion in 2035. In contrast, HDC vaccines account for most of the incremental market expansion, slightly decreased from RMB1.1 billion in 2020 to RMB1.0 billion in 2025, and are projected to grow to RMB 3.4 billion by 2030 and RMB5.3 billion by 2035, reflecting an accelerating shift toward higher-value cell-culture substrates.

China Human Rabies Vaccine Market Production Value, Breakdown by Cell Lines, 2020-2035E



Source: Expert interview, NIFDC, Frost & Sullivan Analysis

Within the Vero-cell segment, there has been a gradual transition from liquid to freeze-dried formulations. Freeze-dried rabies vaccines typically support shelf lives of 24 or 36 months, compared with 12 or 18 months for liquid formulations, and demonstrate improved stability during storage and transportation, reducing cold-chain sensitivity and inventory loss. In addition, their compact presentation and superior logistical flexibility make them better suited to decentralized vaccination settings, including lower-tier cities and resource-limited regions. Although freeze-dried vaccines require reconstitution prior to administration, the additional preparation steps do not materially extend overall vaccination time, limiting operational friction at the point of use.

Compared with conventional serum-based processes, serum-free manufacturing can reduce the risk of adventitious agent introduction, enhance process consistency through the use of chemically defined media, streamline control and documentation requirements for animal-derived materials, and lower downstream purification burden and associated costs.

Competitive Landscape of China Human Rabies Vaccine Market

China’s human rabies vaccine market is highly concentrated, with a small number of domestic manufacturers accounting for the majority of lot-release volumes. Vero cell-derived vaccines make up most of the approved lots each year, and leading producers collectively represent the dominant share of national supply. More recently, manufacturers with expanding HDC-based capacity have begun to gain incremental share, supported by rising demand for products with enhanced safety profiles. In this market in 2025, the Group ranked 3rd, with lot release volume of 7,351.0 thousand doses and a market share of 9.3%. The Group offers products supporting both Essen and Zagreb regimens, enabling greater flexibility across different patient types and clinical settings. This dual-regimen coverage enhances real-world applicability and aligns with diverse post-exposure prophylaxis needs. The following table shows the competitive landscape of China human rabies vaccine market by lot release volume in 2025:

INDUSTRY OVERVIEW

Competitive Landscape of China Human Rabies Vaccine Market, 2025

Rank	Company	Immunization Schedule	Market Share by Lot Release Volume
1	Liaoning Chengda (遼寧成大)	Essen 5 doses & Zagreb 4 doses	39.6%
2	Yidu Biotechnology (山東亦度)	Essen 5 doses & Zagreb 4 doses	13.7%
3	Fosun Adgenvax Group (復星安特金集團)	Essen 5 doses & Zagreb 4 doses	9.3%
4	AIM (艾美疫苗)	Essen 5 doses	8.4%
5	Changchun Zhuoyi Biological (卓誼生物)	Essen 5 doses & Zagreb 4 doses	6.5%
–	Others	–	22.5%
–	Total	–	100.0%

Source: China National Institute for Food and Drug Control, Frost & Sullivan Analysis

Competitive Landscape: Vero Cell-derived Human Rabies Vaccine Market in China

Vero cell-based rabies vaccines continue to represent the largest segment by lot-release volume in China, supported by mature manufacturing processes, stable yields, and wide adoption in county-level CDC procurement. Competition is primarily among a few established domestic producers with long operating histories, and overall market share has gradually consolidated toward leading players in 2025. While the market is mature and approaching saturation, Vero-based products continue to anchor supply for routine post-exposure vaccination. In this market in 2025, the Group ranked 3rd, with lot release volume of 7,351.0 thousand doses and market share of 10.1%. The following table shows the competitive landscape of China Vero-cell derived human rabies vaccine market by lot release volume in 2025:

Competitive Landscape of China Human Rabies Vaccine (Vero Cell) Market, 2025

Rank	Company	Immunization Schedule	Virus Culture Media	Approval Date	Market Share
1	Liaoning Chengda (遼寧成大)	Essen 5 doses & Zagreb 4 doses	Serum-based	2005/01/10	42.9%
2	Yidu Biotechnology (山東亦度)	Essen 5 doses & Zagreb 4 doses	Serum-based	2021/07/12	14.9%
3	Fosun Adgenvax Group (復星安特金集團)	Essen 5 doses & Zagreb 4 doses	Serum-free	2016/09/28	10.1%
4	AIM (艾美疫苗)	Essen 5 doses	Serum-based	2007/10/10	9.1%
5	Changchun Zhuoyi Biological (卓誼生物)	Essen 5 doses & Zagreb 4 doses	Serum-based	2016/11/23	7.0%
–	Others	–	–	–	16.0%
–	Total	–	–	–	100.0%

Notes:

1. The approval date refers to the Group’s earliest approved human rabies vaccine (Vero cell).
2. The end-user price refers to the winning bid median price.

Source: China National Institute for Food and Drug Control, Frost & Sullivan Analysis

Competitive Landscape: Marketed Human Diploid Cell Rabies Vaccines

The market for HDC rabies vaccines is smaller in absolute volume but growing rapidly, driven by the shift toward higher-value, higher-safety cell substrates. Only three domestic manufacturers supply HDC-based rabies vaccines in China, resulting in a more concentrated competitive landscape in China compared with Vero-based products. As awareness of safety advantages increases and

INDUSTRY OVERVIEW

indications for PrEP broaden, HDC vaccines are expected to capture a greater share of incremental market growth. The following table shows the competitive landscape of HDC-derived human rabies vaccine market in China as of the Latest Practicable Date:

Competitive Landscape of China Marketed Human Rabies Vaccine (Human Diploid Cell) Market

Company	Immunization Schedule	Approval Date
Liaoning Chengda (遼寧成大)	Essen 5 doses & Zagreb 4 doses & “1-1-1-1” 4 doses	2026/02/10
MINHAI (民海生物)	Essen 5 doses & Zagreb 4 doses	2023/09/12
Kanghua Biological Products (康華生物)	Essen 5 doses	2012/04/28

Note: Data updated as of the Latest Practicable Date

Source: FDA, NMPA, Frost & Sullivan Analysis

The following table shows the six HDC-derived human rabies vaccine candidates in China as of the Latest Practicable Date:

Cell Line	Company	Clinical Stage	Clinical Status	First Posted Date	Age Coverage
Human Diploid Cell	Ab&B Bio-Tech (中慧元通)	III	Ongoing	2025/12/08	10 years to 60 years of age
		I	Completed	2023/11/20	10 years to 60 years of age
	Sinovac (科興生物)	I	Ongoing	2025/11/18	18 years to 45 years of age
	Changchun Bcht Biotechnology (長春百克)	III	Ongoing	2025/11/11	10 years to 60 years of age
		I	Ongoing	2025/09/05	10 years to 60 years of age
	Fosun Adgenvax Group (復星安特金集團)	III	Ongoing	2026/04/23	All age groups
		I	Ongoing	2025/09/24	All age groups
	AIM (艾美疫苗)	III	Ongoing	2025/06/11	10 years to 60 years of age
		I	Ongoing	2025/05/19	10 years to 60 years of age
	Pukang Biotechnology (普康生物)	III	Ongoing	2024/07/18	10 years of age and older
		I	Completed	2024/03/05	10 years of age and older

Note: Data updated as of the Latest Practicable Date

Source: CDE, Frost & Sullivan Analysis

Growth Drivers and Future Trends of the Human Rabies Vaccine Market

The main growth drivers of the PRC human rabies vaccine market include (i) **Rising Pet Ownership and Exposure Risk:** China’s rapidly expanding urban pet population, exemplified by 124.11 million dogs and cats in 2024, with dog-related injuries accounting for over 95% of global human rabies cases, continues to drive strong demand for post-exposure vaccination amid low animal vaccination coverage; (ii) **Improved Affordability and Strengthened Public Awareness:** WHO’s “Zero by 2030” goal and China’s 2023 clinical guidelines promote timely PEP, adoption of simplified intradermal regimens, and broader PrEP recommendations, supporting higher vaccination uptake; and (iii) **Increasing Adoption of Human Diploid Cell Vaccines:** Human diploid cell rabies vaccines, regarded as the WHO gold standard for safety and immunogenicity, are expected to gain market share as technological improvements reduce production costs and rising incomes enhance affordability.

INDUSTRY OVERVIEW

In the meantime, the market is exhibiting various trends in its ongoing evolution: (i) **Advancement of Serum-Free and Modernized Production Processes**: The shift from serum-supplemented to serum-free culture supported by national industrial policy reduces contamination risks, stabilizes production inputs, and enhances overall vaccine safety and manufacturing efficiency; (ii) **Broader Adoption of Human Diploid Cell Vaccines**: Human diploid cell-derived rabies vaccines, recognized for superior safety and immunogenicity, are expected to gain market share as bioprocessing improvements lower production costs and expand accessibility; and (iii) **Expansion of PrEP Strategies**: Increasing endorsement of PrEP by global and Chinese health authorities supports earlier immunization of high-risk groups and integration into broader public-health program, strengthening long-term prevention efforts.

INFLUENZA VACCINES

Influenza (“flu”) is a highly contagious respiratory illness caused by viruses that infect the nose, throat, and lungs, with clinical presentations ranging from mild symptoms to severe disease or even death in high-risk individuals; annual vaccination is the most effective prevention method. Of the four influenza virus types (A, B, C, and D), human influenza A and B viruses are responsible for seasonal epidemics. Influenza A viruses are classified into subtypes based on their surface proteins, while influenza B viruses have historically comprised two major lineages, B/Victoria and B/Yamagata, with the latter showing markedly reduced circulation in recent years. Demonstrating its fluctuating activity, reported influenza new cases in China dropped from 1,145.3 thousand in 2020 to a five-year low of 668.2 thousand in 2021, then rebounded to 2,442.8 thousand in 2022. This was followed by a surge to 12,780.3 thousand cases in 2023 before a decline to 8,417.4 thousand in 2024 and a further rebound to 17,181.9 thousand in 2025. Despite the temporary decline in 2024, influenza incidence in China rebounded further in 2025, remaining above the pre-resurgence level observed during the pandemic period and reflecting the continued circulation of influenza viruses following the easing of public health restrictions.

Influenza Vaccine Overview

Influenza vaccines can be classified according to their valence. Both trivalent and quadrivalent influenza vaccines are currently used, reflecting differentiated positioning across population segments and procurement settings. Trivalent vaccines are primarily adopted in public procurement and large-scale immunization programs due to their cost efficiency and suitability for budget-constrained populations, while quadrivalent vaccines mainly target individuals with higher protection expectations. In February 2024, WHO noted that no naturally circulating B/Yamagata lineage viruses have been confirmed since March 2020, and therefore considers inclusion of the B/Yamagata component to be no longer warranted. Where quadrivalent vaccines continue to be used, the B/Yamagata component remains unchanged from prior recommendations. Accordingly, trivalent and quadrivalent vaccines are expected to coexist, serving different population groups.

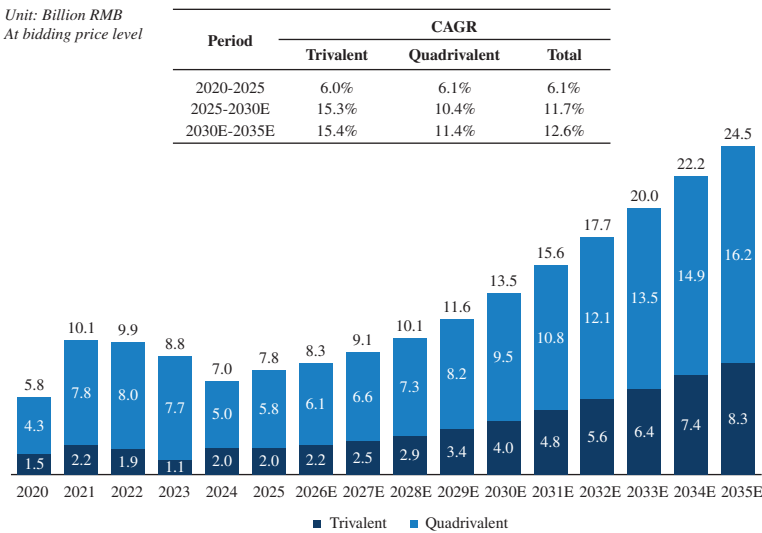
China Influenza Vaccine Market

China’s influenza vaccine market experienced fluctuation from 2020 to 2025. In this market, trivalent vaccines rose from RMB1.5 billion in 2020 to RMB2.0 billion in 2025 at a CAGR of 6.0%. Growth is expected to accelerate to a 15.3% CAGR from 2025 to 2030, reaching RMB4.0 billion by 2030. The market is expected to grow to RMB8.3 billion at a CAGR of 15.4% from 2030 to 2035. Key tailwinds include broader access and volume recovery in cost-sensitive demand. In this market, quadrivalent remains the primary value pool, supported by premiumization in the self-pay market, preference for broader strain coverage, and continued conversion from trivalent to higher-valency products. As such, quadrivalent vaccines grew from RMB4.3 billion in 2020 to RMB5.8 billion in 2025 at a CAGR of 6.1%. The segment is projected to grow at an 10.4% CAGR to RMB9.5 billion by 2030, followed by a 11.4% CAGR to RMB16.2 billion by 2035.

INDUSTRY OVERVIEW

China Influenza Vaccine Market Production Value, by Tri- and Quadrivalent, 2020-2035E

Unit: Billion RMB
At bidding price level



Source: Expert interview, NIFDC, Frost & Sullivan Analysis

Competitive Landscape of China Influenza Vaccine Market

In 2025, China’s influenza vaccine market was concentrated among a small group of established domestic manufacturers. The Group ranked sixth, with lot release volume of 4,195.9 thousand doses, representing a market share of 5.1%, reflecting its growing presence in both trivalent and quadrivalent influenza vaccine supply. The following table shows the competitive landscape of China’s influenza vaccine market by lot release volume in 2025:

Competitive Landscape of China Influenza Vaccine Market, 2025

Rank	Company	Market Share
1	Sinovac (科興)	30.4%
2	Hualan Biological Engineering (華蘭生物)	21.4%
3	Shanghai Institute of Biological Products (上海生物)	12.7%
4	Sanofi Pasteur (賽諾菲巴斯德)	9.4%
5	Changchun Institute of Biological Products (長春生物)	8.2%
6	Fosun Adgenvax Group (復星安特金集團)	5.1%
7	Wuhan Institute of Biological Products (武漢生物)	3.1%
8	Jiangsu GDK Biotechnology (金迪克生物)	3.1%
9	Ab&B Bio-Tech (中慧元通)	2.3%
10	Zhifei Biological Products (智飛生物)	1.8%
-	Others	2.5%
-	Total	100.0%

Source: China National Institute for Food and Drug Control, Frost & Sullivan Analysis

Competitive Landscape: Trivalent Split Influenza Vaccine Market in China

In 2025, top five players in China Trivalent Split Influenza Vaccine Market are Sinovac, the Group, Changchun Institute of Biological Products, Shanghai Institute of Biological Products, and Hualan Biological Engineering. The Group ranked second, with lot release volume of 3,973.4 thousand doses and market share of 15.2%.

INDUSTRY OVERVIEW

The following table shows the competitive landscape of China trivalent split influenza vaccine market by lot release volume in 2025:

Competitive Landscape of China Trivalent Split Influenza Vaccine Market, 2025

Rank	Company	Age Coverage	Market Share
1	Sinovac (科興)	6 months of age and older	49.3%
2	Fosun Adgenvax Group (復星安特金集團)	6 months of age and older	15.2%
3	Changchun Institute of Biological Products (長春生物)	6 months to 3 years of age	11.5%
4	Shanghai Institute of Biological Products (上海生物)	6 months of age and older	10.5%
5	Hualan Biological Engineering (華蘭生物)	3 years of age and older	6.9%
–	Others	–	6.6%
–	Total	–	100.0%

Source: China National Institute for Food and Drug Control, Frost & Sullivan Analysis

Competitive Landscape: Marketed Quadrivalent Influenza Vaccines in China

In 2025, top five players in China’s Quadrivalent Influenza Vaccine Market are Hualan Biological Engineering, Sinovac, Shanghai Institute of Biological Products, Sanofi Pasteur, and Changchun Institute of Biological Products. The Group ranked ninth, with lot release volume of 222.5 thousand doses and market share of 0.4%. The following table shows the competitive landscape of China’s quadrivalent influenza vaccine market by lot release volume in 2025:

Competitive Landscape of China Quadrivalent Split Influenza Vaccine Market, 2025

Rank	Company	Market Share
1	Hualan Biological Engineering (華蘭生物)	29.5%
2	Sinovac (科興)	22.9%
3	Shanghai Institute of Biological Products (上海生物)	14.4%
4	Sanofi Pasteur (賽諾菲巴斯德)	13.4%
5	Changchun Institute of Biological Products (長春生物)	7.0%
6	Wuhan Institute of Biological Products (武漢生物)	4.8%
7	Jiangsu GDK Biotechnology (金迪克生物)	4.7%
8	Chongqing Zhifei Biological Products (智飛生物)	2.8%
9	Fosun Adgenvax Group (復星安特金集團)	0.4%
10	Zhejiang Toyouvax Biopharming (天元生物)	0.1%
–	Total	100.0%

Source: China National Institute for Food and Drug Control, Frost & Sullivan Analysis

INDUSTRY OVERVIEW

Growth Drivers and Future Trends of the Influenza Vaccine Market

The growth of the influenza vaccine market is expected to be driven by a host of factors, including (i) **Demographic Trends and Disease Burden**: Recurrent seasonal influenza waves, coupled with China’s aging population and high pediatric demand, reinforce the need for broad annual vaccination and support sustained market growth; (ii) **Rising Vaccination Awareness**: Strengthening public recognition of influenza risks and the shift toward planned, annual preventive vaccination, guided by national technical recommendations, are driving more consistent uptake across priority groups; and (iii) **Policy Support and Access Expansion**: Government initiatives, including free or subsidized vaccinations for high-risk groups and service optimization under national health plans, are expanding coverage and enabling large-scale, community-based immunization. In addition, a policy introduced in May 2026 by the National Healthcare Security Administration and the Ministry of Finance allows employee basic medical insurance personal accounts to be used for influenza vaccination expenses incurred at designated medical institutions. This policy is expected to further improve vaccine affordability and accessibility and support higher vaccination uptake over the long term.

Certain secular trends can be observed from influenza vaccine’s development, including (i) **Diversification of Technology Platforms**: Influenza vaccine development is shifting toward cell-based, recombinant and mRNA technologies to enhance efficiency and reduce mismatch risk, while established inactivated vaccine platforms continue providing reliable large-scale supply; (ii) **Expansion of Baseline Demand and Premium Formulations**: Growing coverage among older adults sustains strong baseline split-vaccine demand, while high-dose and adjuvanted products gain traction as differentiated options for elderly and immunocompromised populations; and (iii) **Differentiated Market Positioning Across Valencies with Concurrent Growth**: Trivalent and quadrivalent influenza vaccines are positioned to serve distinct population segments: the former, with more established supply chains and lower per-dose prices, primarily address cost-sensitive demand and continue to support volume uptake across a broad base of self-paying users, whereas the latter cater to individuals with higher willingness to pay and stronger preferences for enhanced protection. Lot release data reflect this differentiated positioning, with both trivalent and quadrivalent products maintaining meaningful presence in the market. Going forward, these two formulations are expected to continue to coexist, underpinning a segmented self-paid influenza vaccine market.

PNEUMOCOCCAL VACCINES

Streptococcus pneumoniae (“**Spn**”) is a Gram-positive, encapsulated bacterium that colonizes the human nasopharynx and is a major cause of invasive and non-invasive diseases worldwide. Infection primarily occurs through the transmission of *Streptococcus pneumoniae* via respiratory droplets, whereby bacteria are spread by airborne droplets, for example, when an infected person coughs or sneezes. Spn is responsible for pneumonia, meningitis, bacteremia, otitis media and sinusitis, with young children, older adults and individuals with underlying medical conditions at the highest risk of severe outcomes. Approximately 100 pneumococcal serotypes have been identified, with disease burden concentrated in a smaller subset of serotypes that vary across regions and age groups. According to a research published on *Pneumonia* in 2024, in children under 14 years old in mainland China, vaccine serotype coverage rates were 74.77% for PCV13 and 92.90% for PPSV23. Due to its high transmissibility and the potential for rapid progression to life-threatening illness, Spn remains a critical global pathogen associated with significant morbidity, mortality and healthcare utilization. Pneumococcal disease is typically treated with antibiotics; however, increasing antimicrobial resistance has reduced the effectiveness of many first-line therapies and underscores the importance of prevention. As a result, vaccination is the most effective preventive measure and forms the cornerstone of pneumococcal disease control.

Available vaccines include *polysaccharide vaccines*, such as PPSV23, which provide broad serotype coverage but limited immune memory, and *conjugate vaccines*, such as PCV13, PCV15, PCV20, and higher-valency candidates, which induce robust T-cell-dependent immunity, reduce nasopharyngeal carriage and offer strong protection in young children and older adults. Public-health guidelines globally recommend pneumococcal vaccination for infants, the elderly and high-risk groups, underscoring its essential role in reducing disease burden and preventing severe complications.

INDUSTRY OVERVIEW

Pneumococcal Vaccine Overview

Pneumococcal vaccines function by inducing protective bactericidal antibodies against the bacterial capsular polysaccharides. Based on technological platforms, they are categorized into two main types: PCVs and PPSVs. Currently, PCV13 and PPSV23 are the primary formulations available on the market in China.

The core distinction between PCVs and PPSVs lies in their immunological mechanism. PCVs link the bacterial polysaccharides to a protein carrier. This conjugation enables a T-cell-dependent immune response, which generates robust immune memory, provides a stronger and more durable protective effect, and importantly, reduces nasopharyngeal carriage of the bacteria, contributing to herd immunity. In contrast, PPSVs are composed of purified capsular polysaccharides. They elicit a T-cell-independent response that does not establish immunological memory, and they are generally ineffective in children under two years of age. However, PPSVs offer broader serotype coverage with a single vaccination.

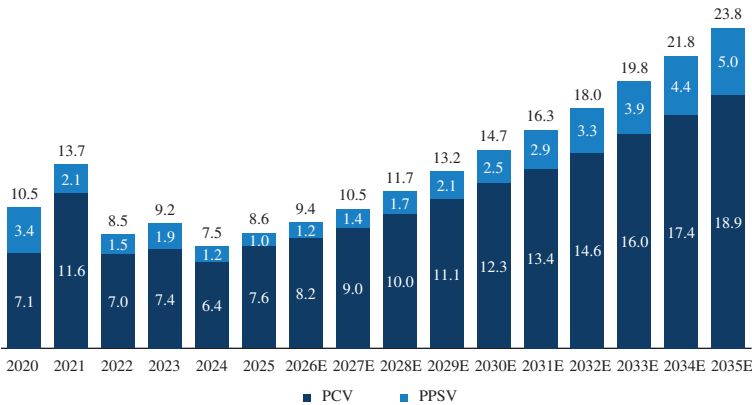
China Pneumococcal Vaccine Market

China’s pneumococcal vaccine production value fell from RMB10.5 billion in 2020 to RMB8.6 billion in 2025, with PCV at RMB7.6 billion and PPSV at RMB1.0 billion. The market is projected to rebound to RMB14.7 billion by 2030 and RMB23.8 billion by 2035, led by PCV growth to RMB12.3 billion and RMB18.9 billion, while PPSV grows faster to RMB2.5 billion and RMB5.0 billion, supported by PCV premiumization and rising adult and elderly uptake. The 2022–2023 dip mainly reflects a shrinking newborn cohort and pandemic-driven disruption to routine vaccination as families prioritized COVID-19 shots, delaying pneumococcal dosing and reducing batch releases.

Pneumococcal Vaccine Production Value in China, Breakdown by Technology Types, 2020-2035E

Unit: Billion RMB
At bidding price level

Period	CAGR		
	PCV	PPSV	Others
2020-2025	1.3%	-22.0%	-4.0%
2025-2030E	10.1%	20.2%	11.5%
2030E-2035E	9.0%	15.1%	10.1%



Source: Frost & Sullivan Analysis.

INDUSTRY OVERVIEW

Competitive Landscape of China Pneumococcal Vaccine Market

The marketed pneumococcal vaccine landscape in China is currently dominated by two major technology types: PPSV23 and PCV13. As of the Latest Practicable Date, six PPSV23 and four PCV13 pneumococcal vaccines were marketed in China. Details of such vaccine products are laid out in the table below:

Technical Route	Valency	Company	Brand Name (Generic Name)	First Approval Date	Age Coverage
PPSV	23-valent	ZFSW (智飛生物)	優威克	2023/08/29	2 years of age and older
		Sinovac (科興)	23-valent Pneumococcal Polysaccharide Vaccine	2020/12/02	2 years of age and older
		Chengdu Institute of Bio (成都生物製品研究所)	惠益康	2006/01/01	2 years of age and older
		MINHAI (民海生物)	維民菲樂	2018/08/12	2 years of age and older
		WALVAX (沃森生物)	沃朵菲	2017/03/22	2 years of age and older
		MSD	PNEUMOVAX (紐莫法)	2014/12/24	50 years of age and older; ≥ 2 years who are at increased risk
PCV	13-valent	Cansino (康希諾)	優佩欣	2025/06/17	6 weeks through 5 years of age
		MINHAI (民海生物)	維民菲寶	2021/09/07	6 weeks through 5 years of age
		WALVAX (沃森生物)	Weuphoria (沃安心13)	2019/12/30	6 weeks through 5 years of age
		Pfizer	Prevnar 13	2016/10/25	6 weeks through 5 years of age

Notes:

1. Data updated as of the Latest Practicable Date.
2. Among the marketed PCV13 products in China, the time from preclinical research to the initiation of Phase III clinical trials typically spans approximately 6–12 years.

Source: NMPA, Frost & Sullivan

All approved PPSV23 vaccines are indicated for individuals aged 2 years and older who are at increased risk. All PCV13 products are indicated for infants and children from 6 weeks through 5 years of age. In the meantime, the pneumococcal vaccine pipeline in China is exceptionally active and innovative, reflecting a strategic shift toward higher-valent conjugate vaccines and next-generation technologies. This intense R&D activity is set to significantly reshape the market landscape in the medium to long term.

INDUSTRY OVERVIEW

The following table shows the 24 pneumococcal vaccine candidates in China as of the Latest Practicable Date, where eight were PCV13 (among which the Group is one of the four having proceeded to Phase III):

Technical Route	Valency	Company	Clinical Stage	Clinical Status	First Posted Date	Age Coverage
Recombinant pneumococcal protein vaccine	Not Applicable	Cansino (康希諾)	I	Completed	2022/11/09	50 years of age and older
			I	Completed	2019/09/06	18 to 49 years of age
PCV	26-valent	ZFSW (智飛生物)	I/II	Ongoing	2024/08/20	2 months of age and older (at least 6 weeks of age)
	24-valent	Cansino (康希諾)	I/II	Ongoing	2026/05/22	2 months of age and older (at least 6 weeks of age)
			II	Ongoing	2025/08/22	6 weeks to 5 years of age
		Reinovax (瑞宙生物)	II	Ongoing	2024/04/15	18 years of age and older
			I	Ongoing	2024/04/15	6 weeks to 5 years of age
			I	Completed	2023/09/25	18 years of age and older
			II	Ongoing	2025/11/18	65 years of age and older
		Kunli Biopharma (坤力生物)	I/II	Completed	2022/02/18	65 years of age and older
			I	Ongoing	2025/09/11	2 months of age to 49 years of age (at least 6 weeks of age)
		Fosun Adgenvax Group (復星安特金集團)	I	Ongoing	2025/05/28	2 months of age and older (at least 6 weeks of age)
			II	Ongoing	2025/11/20	2 months to 5 years of age
		SinoVac (科興生物)	I/II	Ongoing	2025/06/13	18 years of age and older
			I	Ongoing	2025/01/23	2 months to 23 months of age
			I	Ongoing	2024/08/13	2 years to 17 years of age
			I	Ongoing	2024/06/17	18 years of age and older
PCV	21-valent	Sanofi Pasteur (賽諾菲巴斯德)	I	Ongoing	2026/03/05	6 weeks through 15 months
	20-valent	Pfizer (輝瑞)	I	Ongoing	2025/05/07	6 weeks through 49 years of age
			I	Ongoing	2025/06/18	50 years of age and older
		MINHAI (民海生物)	II	Ongoing	2025/03/21	2 months through 5 years of age
			I	Ongoing	2024/11/20	2 months of age and older
		Innovax Biotech (萬泰滄海生物)	I	Ongoing	2023/03/13	6 weeks of age and older
		Microvac/JUWEI (微超/聚微生物)	I	Completed	2023/04/03	2 months to 55 years of age (at least 6 weeks of age)

INDUSTRY OVERVIEW

Technical Route	Valency	Company	Clinical Stage	Clinical Status	First Posted Date	Age Coverage
	15-valent	ZFSW (智飛生物)	III	Completed	2020/12/23	2 months and 3 months of age
			I	Completed	2019/06/04	2 months and 3 months of age
	13-valent	Fosun Adgenvax Group (復星安特金集團)	III	Ongoing	2025/11/13	2 months to 15 months of age (at least 6 weeks of age)
			III	Ongoing	2024/02/26	2 months to 15 months of age (at least 6 weeks of age)
			III	Ongoing	2022/05/07	2 months to 15 months of age (at least 6 weeks of age)
			I	Completed	2020/04/21	2 months to 15 months of age (at least 6 weeks of age)
		SinoVac (科興)	III	Ongoing	2023/10/19	2 months to 5 years of age
			I	Ongoing	2023/12/12	2 months, 2 years to 5 years of age
			I	Ongoing	2022/08/30	2 months of age and older
		Chengdu Institute of Bio (成都生物)	I	Ongoing	2023/03/23	2 months to 59 years of age
		BravoVax, chengda (博沃/遼寧成大)	I	Ongoing	2022/10/28	2 months of age and older
PCV	13-valent	Microvac Biotech (微超生物)	I	Completed	2022/03/24	2 months to 49 years of age
		AIM (艾美疫苗)	III	Ongoing	2021/12/24	2 months to 5 years of age
		Kunli Biopharma (坤力生物)	I	Ongoing	2021/07/27	2 months of age and older
		Lanzhou Institute of Bio (蘭州生物)	III	Completed	2019/09/19	2 months, 3 months, 7 months through 5 years of age
PPSV	23-valent	Fosun Adgenvax Group (復星安特金集團)	Clinical Trial Approval	Ongoing	2024/07	2 years of age and older
		AIM (艾美疫苗)	III	Ongoing	2023/08/01	healthy populations at 2 years of age and older
			I	Ongoing	2021/11/24	high-risk populations at 2 years of age and older
		Beijing Hua'an (北京華安科創)	I	Completed	2020/09/08	2 years of age and older
		Lanzhou Institute of Bio (蘭州生物)	III	Completed	2015/12/24	2 years of age and older

Note: Data updated as of the Latest Practicable Date.

Source: CDE, Frost & Sullivan Analysis

Growth Drivers and Future Trends of the Pneumococcal Vaccine Market

The growth of the pneumococcal vaccine market is underpinned by various factors, including (i) **Increasing Disease Risk Among the Elderly**: China’s rapidly growing elderly population, rising from 222.5 million in 2024 toward over 320 million by 2035, underpins steadily increasing pneumococcal disease risk and long-term vaccination demand; (ii) **Higher Awareness and Improved Adult Access**: Rising preventive-care awareness, together with regional procurement, local subsidies and pilot free-vaccination programs for older adults, is expanding affordability and access beyond the non-NIP setting; (iii) **Upgrade Cycle Toward Higher-Valent Vaccines**: A broad pipeline of higher-valent conjugate vaccines, ranging from PCV15 to PCV26, supports market expansion as China transitions from PPV23 and PCV13 toward wider serotype coverage and broader age indications.

INDUSTRY OVERVIEW

In the future, the market is expected to continue its ongoing evolution due to (i) **Growth of Domestic Pneumococcal Vaccine Supply**: Supported by national policy and returning technical talent, domestic PCV13 and PPSV23 production is expanding, gradually reducing multinational companies’ dominance and increasing overall vaccine availability; (ii) **Broader Population Coverage and Clinical Expansion**: Ongoing clinical programs are widening age indications, extending PCV13 coverage from infants to middle-aged adults and supporting adult use of emerging higher-valent conjugate candidates; and (iii) **Shift Toward Higher-Valent and Adult-Focused Vaccines**: Market development is moving toward PCV20, PCV24 and other high-valent products with adult indications, driven by serotype replacement and increasing disease burden in older populations.

MENINGOCOCCAL VACCINES

Neisseria meningitidis is a bacterium that causes invasive meningococcal disease (“IMD”), a severe and rapidly progressing illness including meningitis and septicemia, which is spread via respiratory droplets and poses the highest risk to infants and adolescents. Prevention is primarily achieved through vaccination. Marketed vaccines are classified by serogroup coverage (valency) and technology, with modern multivalent conjugate vaccines becoming the global standard due to their durable and robust immune response, superior to older polysaccharide technologies. Vaccination strategies differ globally; for example, U.S. guidelines focus on adolescents, whereas China’s program targets young children.

China Meningococcal Vaccine Market Size

China’s meningococcal vaccine market edged down from RMB2.5 billion in 2020 to RMB2.3 billion in 2025 with a CAGR of -1.4%, after a temporary peak at RMB3.4 billion in 2023. The 2024 decline was mainly driven by a shrinking newborn cohort that reduced the base immunization population. Looking ahead, the market is expected to recover from RMB2.3 billion in 2025 to RMB3.6 billion by 2030, delivering a 8.9% CAGR, supported by normalization after the 2024 correction, improving uptake as routine vaccination behavior stabilizes, improving vaccination awareness, and continued product upgrades in meningococcal vaccines. The market is expected to expand to RMB4.8 billion by 2035 at a 6.1% CAGR.

Competitive Landscape of China Meningococcal Vaccines

China’s meningococcal vaccine market, dominated by domestic manufacturers, is rapidly transitioning from older polysaccharide vaccines to superior conjugate formulations due to their enhanced, longer-lasting protection. This market evolution is driving competition toward higher-valency products like MenACWY. Reflecting this trend, China’s vaccine pipeline is heavily focused on developing next-generation MenACWY and MenABCWY candidates, aligning with global innovation to serve both domestic and export markets. Also, the inclusion of recombinant MenB protein-based vaccines in pipeline activity supports China’s long-term move toward broader meningococcal serogroup coverage. Collectively, these developments indicate a competitive, innovation-oriented pipeline landscape in which Chinese companies are increasingly positioned to deliver higher-valent, longer-lasting, and internationally competitive meningococcal vaccines. As of the Latest Practicable Date, no MenB vaccine was commercialized in China.

Valency	Technical Route	Company	Clinical Stage	Clinical Status	First Posted Date	fHbp Variant Coverage
MenB	Recombinant Vaccine	ZFSW (智飛綠竹)	I	Ongoing	2023/04/26	Not available
	OMV	Delonix Biotech (羽冠生物)	Clinical Trial Approval	Ongoing	2025/11/14	Not available
	Recombinant Vaccine	Fosun Adgenvax Group (復星安特金集團)	Preclinical Research	/	/	V1 , V2, V3

Notes:

1. Data updated as of the Latest Practicable Date.
2. fHbp is a key protective antigen in MenB vaccine development. Based on amino-acid sequence similarity, fHbp variants are commonly grouped into variant families V1, V2, and V3.

Source: CDE, Frost & Sullivan Analysis

INDUSTRY OVERVIEW

Growth Drivers and Future Trends of the Meningococcal Vaccine Market

The meningococcal vaccine market’s growth is driven by the rising incidence of serogroups W and Y, accelerating a global shift to broader quadrivalent (ACWY) conjugate vaccines and the expansion of immunization programs to adolescents. While Western countries have established routine adolescent vaccination, China’s coverage remains limited. A significant public health and market gap exists as MenB, which represents a substantial proportion of global IMD cases, currently has no licensed vaccine in China. The future market is trending toward even higher-valent vaccines (like MenABCWY), favoring premium products with better coverage and driving innovation in the private sector despite demographic challenges.

SOURCE AND RELIABILITY OF INFORMATION

In connection with the [REDACTED], we engaged an independent market research consultant, Frost & Sullivan, to conduct an analysis of, and to prepare an industry report on the industries where we operate with a commission fee of RMB550,000. Founded in 1961, Frost & Sullivan is an independent global consulting firm that conducts industry research and prepares industry report on a wide range of industries, among other services. The information from Frost & Sullivan disclosed in this document is extracted from the Frost & Sullivan Report with its consent. In compiling and preparing the Frost & Sullivan Report, Frost & Sullivan used the following key methodologies to collect multiple sources, validate the collected data and information, and cross-check each respondent’s information and expressions against those of others: (i) detailed primary research, which involved discussing the status of the industry with leading industry participants and industry experts; and (ii) secondary research, which involved reviewing published sources including reports of market participants, independent research reports and data based on Frost & Sullivan’s own research database. Frost & Sullivan adopted the following primary assumptions while making projections for preparing the Frost & Sullivan Report: (i) global economy is likely to maintain steady growth in the next decade; (ii) global social, economic and political environment is likely to remain stable in the forecast period; and (iii) market drivers such as favorable policies, increasing demand for power supply, technological improvements, among others. Except as otherwise noted, all of the data and forecasts contained in this section are derived from the Frost & Sullivan Report. Our Directors confirm that after taking reasonable care, there is 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.