
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 [REDACTED], Joint Sponsors, [REDACTED], any of their respective directors and advisers, or any other persons or parties involved in the [REDACTED], and no representation is given as to its accuracy. Accordingly, the information from official government sources contained herein may not be accurate and should not be unduly relied upon.

SOURCE OF INFORMATION

We engaged Frost & Sullivan, a market research consultant, to prepare the industry report for use in this document. Frost & Sullivan is an independent global consulting firm founded in 1961. Frost & Sullivan provides market research on a variety of industries, including healthcare. The information from Frost & Sullivan disclosed in this document is extracted from the Frost & Sullivan Report, and is disclosed with the consent of Frost & Sullivan.

Frost & Sullivan has conducted detailed primary research that involved discussing the status of the industry with certain leading industry participants. Frost & Sullivan has also conducted secondary research that involved reviewing annual reports and official websites of market players for background information and relevant financial data. In addition, Frost & Sullivan conducted interviews with experts from certain leading industry participants. Frost & Sullivan has also taken into account the market statistics obtained from China Health Statistics Yearbook in determining the overall market size of the industry. In preparing the Frost & Sullivan Report, Frost & Sullivan has adopted a market engineering forecasting methodology that integrates several forecasting techniques with its market engineering measurement-based system. It relies on the expertise of its analyst team in integrating the critical market elements investigated during the research phase of the Frost & Sullivan Report. These elements include expert-opinion forecasting methodology, integration of market drivers and restraints, integration with the market challenges, integration of the market engineering measurement trends and integration of econometric variables.

In particular, Frost & Sullivan has taken into consideration the impact of COVID-19 in preparing its report. The outbreak of COVID-19 pandemic has led to the surge in COVID-19 testing in 2020 and 2021. At the same time, the favorable policies relating to COVID-19 state that the State Council has proposed for the first time to commission independent medical testing laboratories to conduct COVID-19 testing tasks, and third-party medical operation service providers can help medical institutions expand their testing capacity. On the other hand, the COVID-19 outbreak was also factored into the assumptions for 2021, due to infections and spreads of Delta variant. After COVID-19 pandemic was contained, demand for other diagnostic testing will release; at the same time, the recognition of third-party medical

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operation service providers by government and hospitals has increased during COVID-19 pandemic, which are also key growth drivers of medical operation service market. As a result, the increasing trend of the market will further maintain after 2021.

The basis and assumptions adopted by Frost & Sullivan in making its forecast include: (i) the social, economic and political environments of the PRC will remain stable during the forecast period, which will ensure a sustainable and steady development of the PRC healthcare industry; (ii) the PRC healthcare market will grow as expected due to rising healthcare demand and supply; (iii) the PRC government will continue to support healthcare reform; and (iv) the respective healthcare market where we provide our services will grow during the forecast period.

Frost & Sullivan and we believe that the basic assumptions used in preparing the Frost & Sullivan Report, including those used to make future projections, are factual, correct and not misleading. Frost & Sullivan has independently analyzed the information, but the accuracy of the conclusions of its review largely relies on the accuracy of the information collected. We expect to pay Frost & Sullivan a fee of RMB650,000 for the preparation and update of its industry report, which is not contingent upon the completion of the [REDACTED].

HEALTHCARE SERVICE MARKET IN CHINA

Overview of the Healthcare Service Market in China

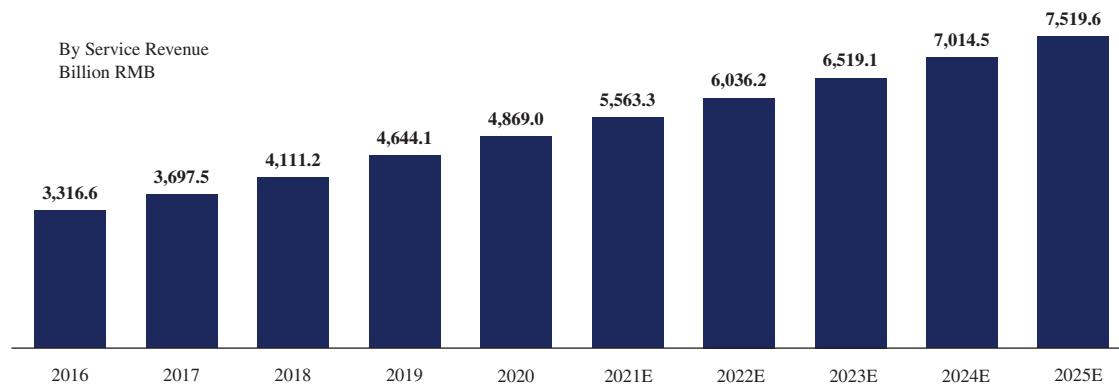
The healthcare service market in China refers to the provision of medical, remedial or care services, including the provision of inpatient and outpatient testing and treatment of human diseases or dysfunction as well as dispensing of drugs or medical devices for treatment. Healthcare service providers in China consist of primary medical institutions (including Class I hospitals, unrated hospitals and other medical institutions, such as maternity & child medical institutions, centers for disease control and special disease prevention agencies), secondary medical institutions (including Class II hospitals) and tertiary medical institutions (including Class III hospitals).

The potential of China’s healthcare service market is tremendous. From 2016 to 2020, the total healthcare service market in China has increased from RMB3,316.6 billion to RMB4,869.0 billion, representing a CAGR of 10.1%. However, the total healthcare expenditure as a percentage of GDP in China is relatively low as compared to that of developed countries. The total healthcare expenditure in China only accounted for 7.1% of its GDP in 2020, whereas the total healthcare expenditure in the United States and Japan accounted for 19.2% and 12.4% of their respective GDP in 2020, respectively. Furthermore, China only had a per capita national healthcare expenditure of US\$745.8 in 2020, compared to US\$12,114.8 per capita in the United States and US\$5,407 per capita in Japan. Driven by the increasing awareness of healthcare and the aging population, the total healthcare service market in China is forecasted to reach RMB7,519.6 billion by 2025, which represents a CAGR of 9.1% from 2020 to 2025.

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Healthcare Service Market in China, 2016-2025E

Period	CAGR
2016-2020	10.1%
2020-2025E	9.1%



Source: National Bureau of Statistics of China, Frost & Sullivan Analysis

China’s Healthcare Service Providers

By the end of 2020, there were 35,394 hospitals in China. With regard to the ownership, China’s hospitals are mainly categorized as public hospitals primarily being not-for-profit hospitals organized by the government and private hospitals (primarily being for-profit hospitals organized by enterprises and other non-government institutions). In terms of hierarchy of hospitals, China’s hospitals are categorized as rated and unrated hospitals, of which there were 25,652 and 9,742 as of December 31, 2020, respectively. For rated hospitals, they were further categorized as Class III hospitals (tertiary hospitals), Class II hospitals (secondary hospitals) and Class I hospitals, of which there were 2,996, 10,404 and 12,252 in China as of the end of 2020, respectively. Class III hospitals are at the highest level, typically having more than 500 beds, providing high-level specialist medical and healthcare services to several regions and performing advanced teaching and research tasks. Class II hospitals typically have 100 to 499 beds, providing regional medical and healthcare services. Class I hospitals are hospitals providing medical and healthcare services for communities, typically having 10 to 99 beds. Each tier hospitals are further divided into three grades – Grade A, B and C. These grades are evaluated according to the technique level, medical equipment, management level, service quality, among others.

Pain Points of the Healthcare Service Market in China

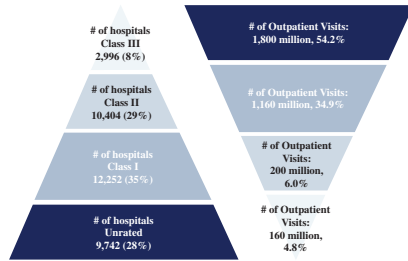
Uneven Distribution of Medical Resources

There is an uneven distribution of medical resources and diagnosis demands in China. China’s medical resources are concentrated in Class III hospitals, and patients prefer to seek healthcare services in these hospitals, which leads to (1) an uneven concentration of medical resources and diagnosis demands in Class III hospitals, while a large proportion of patients only have common or chronic diseases and they can be diagnosed and treated well in Class I

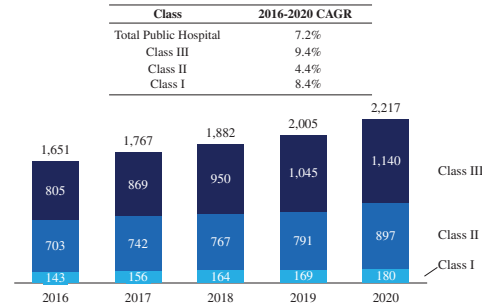
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and Class II hospitals; and (2) insufficient medical resources (including medical professionals and technology) in China’s primary medical institutions. From 2016 to 2020, there were more doctors in Class III hospitals in total than in Class II and Class I hospitals combined. The following diagrams sets forth the number of doctors in Class III, Class II and Class I hospitals.

Uneven Distribution of Medical Resources and Diagnosis Demands, 2020



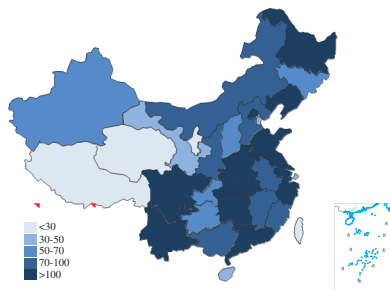
Number of Certified (Assistant) Doctors by Hospital Class, 2016-2020



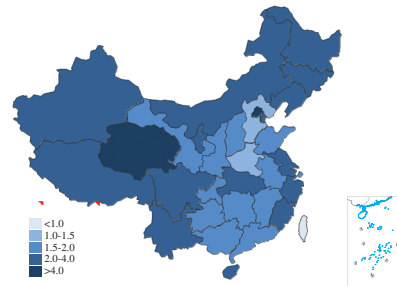
Source: National Health Commission of China, Frost & Sullivan Analysis

In addition, medical resources are distributed unevenly among different geographical regions in China. Medical resources are concentrated in the economically developed regions, which aggravates the insufficiency of medical resources in under-developed regions. In 2020, in developed regions such as Beijing, Shanghai and Guangzhou, there are more than 100 Class III hospitals in each city. On the other hand, in relatively under-developed provinces, there are fewer Class III hospitals in each province, and, on average, less than four Class III hospitals per million population. The following diagrams set forth the geographical distribution of Class III hospitals in China.

Geographic Distribution of Class III Hospitals in China, 2020



of Class III Hospitals Per Million Population in China, 2020



Source: National Health Commission of China, Frost & Sullivan Analysis

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Lack of Standardized Quality Management

Currently, there is a lack of standardized quality management across different medical institutions, typically in China’s primary medical institutions. Most Class I and unrated hospitals do not have adequate experience, awareness, standards and guidelines to establish a sound quality management system and provide high-quality medical services, such as diagnostic testing, which leads to difficulty in mutual recognition of diagnostic results with Class II or Class III hospitals. As a result, patients’ referral and transfer is costly and inefficient, as the referee hospital may need to conduct a new set of diagnostic testing to understand the patients’ condition. Due to the potential duplicated diagnosis expenses, patients prefer to go to secondary or tertiary medical institutions directly.

Key Roles of Diagnostic Testing

Diagnostic testing is key to an effective operation of the HDTs and is critical for the reformation of China’s healthcare system. Through diagnostic testing, patients can be directed to appropriate hospitals which will focus medical resources on appropriate patients, and thus the hospitals’ efficiency can be improved.

Diagnostic testing is a medical procedure that involves the entire lifecycle of medical service from disease prevention, treatment to prognosis. The establishment of standardized diagnostic testing can not only improve testing accuracy, but also help hospitals enhance their diagnostic capacities, and further improve their service quality significantly throughout this lifecycle.

Although diagnostic tests only account for a small portion of time and medical costs from the patients’ perspective, it will assist the doctors to better understand the health condition of the patients, enabling them to make medical decisions and provide the most suitable treatment plans. According to Frost & Sullivan, diagnostic test results can generally influence approximately 70%-80% of decisions made by doctors. As such, diagnostic tests will also significantly influence the time and costs involved in the treatment after diagnosis. Efficient and accurate diagnostic test results generally will lead to efficient distribution of medical resources.

Diagnostic testing is therefore becoming increasingly important in medical institutions and to medical institution alliances. Diagnostic testing nowadays covers a wide range of therapeutic areas, including but not limited to infectious disease, pathology, genetic disease, hematologic disease, maternity and neurology. In addition, diagnostic tests lay the foundation of several areas that are becoming increasingly important in recent years, such as genetic reproduction and pathological diagnosis and treatment.

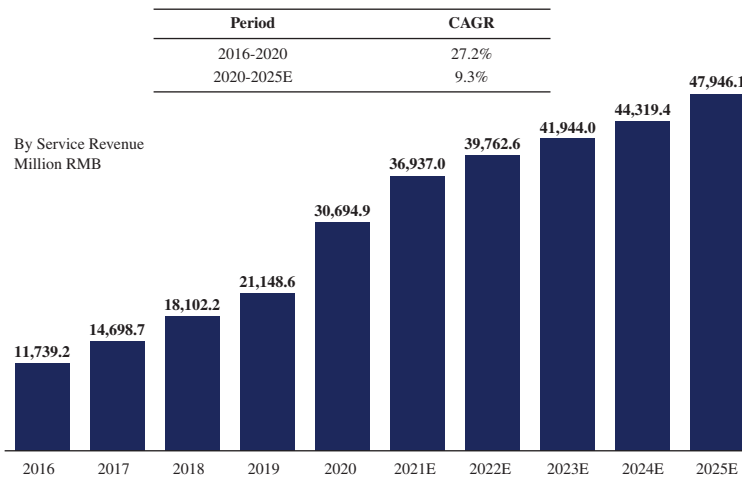
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MEDICAL OPERATION SERVICE MARKET IN CHINA

Overview

Medical operation services primarily relate to diagnostic testing services provided to medical institutions which can be divided into diagnostic outsourcing services and diagnostic testing services for medical institution alliances. With the enactment of favorable policies and growing awareness of healthcare in China, China’s medical operation service market has experienced rapid growth, increasing from RMB11,739.2 million in 2016 to RMB30,694.9 million in 2020 at a CAGR of 27.2%. It is expected that China’s medical operation service market will continue its significant growth, reaching RMB47,946.1 million in 2025 at a CAGR of 9.3% from 2020 to 2025. The following chart illustrates the historical and forecasted market size of China’s medical operation services.

Medical Operation Service Market in China, 2016-2025E

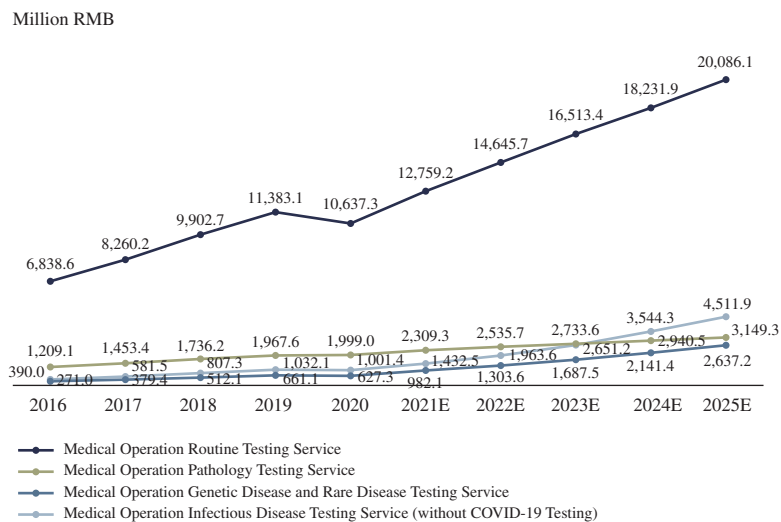


Source: Annual reports, Company Website, China Health Statistic Yearbook, Expert Interviews, Frost & Sullivan Analysis

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Generally, there are four major types of diagnostic tests, namely routine testing, pathology testing, genetic disease and rare disease testing and infectious disease testing. Pathology testing, genetic disease and rare disease testing and infectious disease testing generally have higher technical and operational requirements. As such, medical institutions often engage medical operation service providers for these tests. The following chart summarizes the historical and forecasted market size for each major type of diagnostic tests.

Period, CAGR	Medical Operation Routine Testing	Medical Operation Pathology Testing	Medical Operation Genetic Disease and Rare Disease Testing	Medical Operation Infectious Disease Testing (without COVID-19 Testing)
2016-2020	11.7%	13.4%	23.3%	26.6%
2020-2025E	13.6%	9.5%	33.3%	35.1%



Source: Frost & Sullivan Analysis

History of ICLs in China

An ICL is a medical institution which is an independent legal entity with qualifications to engage in clinical testing or pathology laboratory services under the permission of the health administrative department. The development of the ICL industry in China can be divided into five stages, infancy stage (1980s-1994), exploration stage (1994-2004), primary development stage (2004-2016), rapid development stage (2016-2019) and accelerated development stage (2019 till now).

- *Infancy stage (1980s-1994)*

Prior to 1980s, all of the medical testing services in China were provided by the clinical laboratory and pathology departments under medical institutions. With the development of diagnostic technology and changes in clinical needs, small and medium-sized hospitals had been unable to undertake comprehensive tests due to their limited capacity, resulting in the need to transfer their patients’ test samples to large hospitals for diagnosis.

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- *Exploration stage (1994-2004)*

With the opening of market development for medical services, some testing service centers began to cooperate with hospitals to form as single ICLs, which only provide limited testing and did not achieve scale benefits. In 1994, the first ICL was established in China and was affiliated with a medical college. From 1994 to 2004, the ICL industry in China began to slowly develop.

- *Primary development stage (2004-2016)*

In 2004, the Ministry of Health organized the first ICL seminar in China which brought together medical experts, suppliers of medical devices and reagents across China. Since then, a large number of domestic ICLs and chain institutions had been established. In 2009, the Ministry of Health issued Basic Standards for Medical Laboratory, officially recognizing the legal status of ICLs, and since then the industry has experienced significant growth. Since 2014, the ICL industry has entered a new stage of innovative development. ICLs in China started to expand rapidly in a larger scale. On September 8, 2015, the General Office of the State Council issued the Guiding Opinions on Boosting the Construction of a Tiered Diagnosis and Treatment System (《關於推進分級診療制度建設的指導意見》) to guide localities in promoting the development of a hierarchical system for provision of diagnostic and medical services. With the implementation of these policies, the ICL market continued to flourish.

- *Rapid development stage (2016-2019)*

In 2016, the National Health Commission issued the Basic Standards and Practice of Medical Test Laboratories (for Trial Implementation) (《醫學檢驗實驗室基本標準和管理規範(試行)》), which encouraged the development of chain ICLs and application of new testing technology, promoting the expansion of esoteric testing market. In 2018, Nation Health Commission issued the Notice on Further Reforming and Improving Medical Institutions and Doctors’ Approval Work (《關於進一步改革完善醫療機構、醫師審批工作的通知》) that the medical testing services of public hospitals can be outsourced to third-party medical institution, further boosting the growth of the ICL market.

- *Accelerated development stage (2019 till now)*

In response to the outbreak of COVID-19 in the late 2019, the government has issued many regulations on standardizing the management and quality control systems of ICLs to improve their level of accuracy and consistency. In February 2021, the State Council issued Regulations for the Supervision and Administration of Medical Devices (《醫療器械監督管理條例》), which provided that for in-vitro diagnostic reagents that do not have an approved marketed version in China, qualified medical institutions can develop them on their own according to the clinical needs of their own laboratories, and use them in their own laboratories under the guidance of qualified medical personnel. Due to increasing demand and favorable policies, the number of ICLs in China increased from approximately 100 in 2012 to over 1,800 in 2020.

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According to the Frost & Sullivan Report, ICL has significant market potential in China. In terms of numbers of ICLs, as of December 31, 2020, there were more than 1,800 ICLs in China, comparing to 6,800 ICLs in the United States. In terms of testing capacity, leading ICLs in China can provide approximately 3,500 testing items, comparing to approximately 5,000 testing items in Europe and the United States. Moreover, the geographic spread-out of the ICLs are highly concentrated in China in particular in the first- and second-tier cities. It is hard for many medical institutions to find qualified ICLs nearby and therefore they have to conduct diagnostic tests themselves even if it is time- and cost-consuming for them to do so. In particular, for diagnostic tests with relatively high technical and operational requirements, especially pathology tests, genetic disease tests and infectious disease tests, lower class medical institutions do not have the required technical and operational capabilities to perform such tests, but many of the medical institutions are located in areas that do not have qualified ICLs nearby and have to rely on the diagnostic testing capacities and capabilities from Class II/III hospitals for these tests. As a result, in terms of the total number of medical tests in 2020, the ICLs only have a penetration rate of 6% in China, compared to the penetration rate of 50% and 35% in Europe and the United States, respectively. With the growing number of ICLs in China and the potential growth of the medical institution alliances, it is expected that more medical institutions will choose to engage medical operation service providers for diagnostic testing services. To support the growth of ICLs in China, the PRC government has introduced a series of healthcare reforms, such as the Measures for the Administration of Clinical Laboratories in Medical Institutions (《醫療機構臨床實驗室管理辦法》), in order to regulate this industry and to support the growth and investment in ICLs.

Key Drivers

The growth of medical operation service market is expected to be primarily driven by the following factors:

- *Favorable government policies.* The PRC government has promulgated several policies to support the development of the HDTs and the medical institution alliances to promote proper allocation of medical resources. These positive government policies are expected to drive the future growth of medical operation service market in China.
- *Lack and uneven distribution of medical resources.* Under the HDTs, primary medical institutions will take more responsibility in day-to-day diagnosis and medical treatment operations. Primary medical institutions will need diagnostic testing related supports to improve their overall capability to meet patients' medical demands.
- *Unmet demand for chronic disease management and rehabilitation.* The PRC government is paying more attention to chronic disease management and rehabilitation. Different from acute disease or incurable disease, chronic disease need to be managed in long term in a scientific way. It is important for primary medical institutions to take the major responsibility in chronic disease management

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and rehabilitation. Primary medical institutions will need diagnostic testing related supports to fulfill their obligations under chronic disease management and rehabilitation. However, many primary medical institutions do not have such capabilities and need third parties’ supports to build up their diagnostic testing operations.

Future Trends

The primary future trends of medical operation service market in China include the following, indicating significant development potential and unmet demands:

- *Development of the HDTS.* The PRC government is promoting the development and efficient operation of the HDTS. With the development of the HDTS, Class I and Class II hospitals will play more important roles in patients’ diagnosis in China. As a result, proper diagnostic testing and information sharing are required to identify patients’ need and allocate medical resources among different classes of hospitals.
- *Integration of medical operation services.* It is expected that medical operation services in China will experience integration in the future as hospitals will prefer market players that has a comprehensive portfolio of diagnostic services to facilitate the distribution of medical resources and demands. As such, market players that can provide integrated diagnostic services are expected to benefit the most from this.
- *Increasing number of on-site diagnostic centers.* As medical institution alliances are still at their early stages in China, currently only a few companies can provide technical supports needed for on-site diagnostic centers. It is expected that with the growing number of on-site diagnostic centers, there will be more market players to provide such services and existing leading companies in this market will benefit the most from their first-mover advantages.
- *Improvement of diagnostic capability and capacity at primary hospitals.* Under an efficient HDTS, primary hospitals play an increasingly important role in dealing with common and chronic diseases, which will present significant demands for medical services, and will need to build up their diagnostic capacity in these hospitals. As such, it is expected that the diagnostic capabilities and capacities at these hospitals will further improve in the future.
- *Improvement of standardization and quality control.* Standardization and quality control are the foundations of diagnostic testing. Medical institutions’ and ICLs’ diagnostic capabilities are only sustainable if they have established standardization and quality control protocols and rules and market players that have established such protocols and rules will benefit the most from this.

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- *Increasing number of infectious disease diagnostic tests.* With the growing awareness of infectious diseases, it is expected that the number of infectious disease diagnostic tests will significantly increase. In particular, the COVID-19 pandemic has increased market demands for COVID-19 nucleic acid tests. It is expected the growing number of infectious disease diagnostic tests will further drive the growth of China’s medical operation service market.

Key Entry Barriers

- *In-depth understanding of healthcare services and mass diagnostic testing.* The proper performance of diagnostic testing services requires in-depth understanding of the industry and the need of hospitals. Successful diagnostic testing service providers generally have over ten years’ experience in the industry, which is critical to their ability to offer diagnostic testing consultancy. It is challenging for new entrants to understand the industry practice and to establish credibility and reliability in diagnostic testing in a short time.
- *Standardized and modularized complex diagnostic procedures.* Diagnostic testing service providers need to establish and comply industry standards and procedures to ensure testing accuracy and service quality. Such standards and procedures include specimen collection, readings of testing result, testing result turnaround time and data integrity. As it generally takes time to establish and revise these standards and procedures, it is difficult for new entrants to establish a standardized system in order to ensure testing accuracy and service quality in a relatively short time.
- *Understanding in regulatory framework.* Diagnostic testing service providers need to ensure their compliance with industry laws and regulations. In addition, the practice require Medical Institution Practice License issued by the local health administrations. Due to the strict standard to obtain such license, new entrants need to hire medical professionals and procure specialized testing facilities to operate the business, with significant amount of investments.

DIAGNOSTIC OUTSOURCING SERVICE MARKET IN CHINA

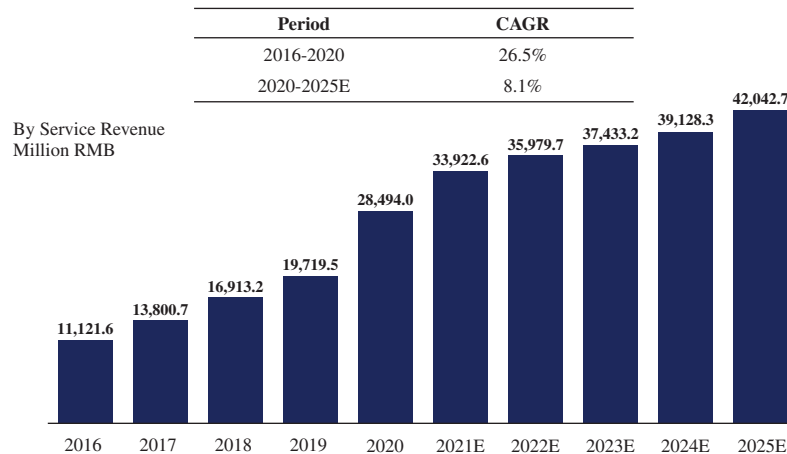
Overview

Accurate and efficient diagnosis forms the basis of precision medicine. As a result, hospitals have to build up their diagnostic testing practice to enhance their clinical and pathological diagnostic capabilities. However, diagnostic testing is a time- and cost-consuming process and it may not be cost-effective for hospitals to conduct all of such tests themselves. As such, there is significant market demand for ICLs that can provide standardized and modularized one-time diagnostic testing services. Driven by this, the size of China’s diagnostic outsourcing service market has experienced rapid growth, growing from RMB11,121.6 million

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in 2016 to RMB28,494.0 million in 2020. It is expected that the diagnostic outsourcing service market will reach RMB42,042.7 million in 2025. The following chart illustrates the historical and forecasted market size of China’s diagnostic outsourcing service market.

Diagnostic Outsourcing Service Market in China, 2016-2025E



Source: Annual reports, Company Website, China Health Statistic Yearbook, Expert interviews, Frost & Sullivan Analysis

Diagnostic outsourcing services aim to provide a one-time solution for medical institutions that are lack of or short of diagnostic capabilities and capacities instantly. For medical institutions that do not have their own diagnostic capabilities and capacities, they are substantially relying on diagnostic outsourcing services for the provision of diagnostic tests. In recent years, with the support of favorable government policies which have stimulated the development of diagnostic testing services for medical institution alliances, medical institutions have the opportunity to work with medical operation service providers to perform diagnostic testing on-site at the corresponding diagnostic center so that the test samples collected at the medical institutions do not need to be delivered to the ICLs for testing. Instead, the medical institutions can complete the testing at these diagnostic centers. Therefore, it is expected that the growth of the diagnostic outsourcing service market in China will significantly slow down in the future and eventually take less market share in China’s medical operation service market as compared to the diagnostic testing services for medical institution alliances market.

Key Drivers

The growth of China’s diagnostic outsourcing service market is expected to be driven by the following factors.

- **Aging population.** The population in China has aged rapidly, with the number of people aged above 65 grew at a CAGR of 5.4% from 2016 to 2020 and is expected to grow further at a CAGR of 5.4% from 2020 to 2025 and reach 240.7 million by

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the end of 2025. China’s severe aging issue has directly led to a surge in the prevalence of chronic diseases and an increase in the patient flow of serious diseases, both of which have and will continue to drive the testing demands, thereby boost the testing volume.

- ***Increasing end customer demands.*** Currently, public hospitals in China are generally operating above their capacity. National Healthcare Security Administration has implemented many regulations to control healthcare costs from hospitals, such as Technical Specifications on National Healthcare Security DRGs Grouping and Payment (《國家醫療保障DRG分組與付費技術規範》). As a result, more and more public hospitals are outsourcing their clinical testing services to third-party providers to reduce its burden caused by the overwhelming demand. More stringent cost control in both public and private hospitals also leads to the outsourcing of clinical tests.
- ***Medical insurance coverage.*** On September 5, 2018, China National Health Development Research Center issued a project report on effect evaluation and experience summary of independent clinical Laboratory (第三方醫學實驗室效果評估及經驗總結項目報告) in Guangzhou and pointed out that ICLs can save approximately 1% of China’s total medical insurance expenditures, thereby saving nearly RMB22.1 billion of medical insurance funds in 2019. Due to ICLs’ outstanding cost-saving capabilities, Chinese government is devoted to continuously expanding medical insurance coverage for tests outsourced to ICLs, which is expected to further encourage testing outsource to ICLs from hospitals. China National Health Development Research Center estimated that the testing costs saved by ICLs from 2016 to 2020 amounted to RMB10.4 billion, RMB13.7 billion, RMB17.6 billion, RMB22.1 billion and RMB27.4 billion in each year, respectively. Owing to ICLs’ cost-saving capabilities, the government intended to increase its recognition of ICLs by connecting them into the medical insurance system.
- ***Favorable policies under healthcare reform.*** Chinese government had carried out a series of healthcare reforms and introduced favorable policies aiming to reshape the clinical laboratory industry and to stimulate the diagnostic outsourcing service. For example, in 2013, the NHFPC issued The Catalogue of Clinical Testing Items, which standardized the development of routine and esoteric testing. It is expected that such reform will turn hospitals’ testing centers from revenue-oriented to cost-oriented, encouraging them to outsource more tests to ICLs that have more scale and cost advantages. In December 2016, Plan for Deepening Reform of the Medical and Healthcare System during the 13th Five-Year Plan Period (《“十三五”深化醫藥衛生體制改革規劃》) issued by NDRC specifically requires hospitals to decrease repeat testing, lower test prices, and reduce the growth of healthcare expenditure in public hospitals to 10% by the end of 2017. Later in 2017, in the 13th Five-Year Plan for Biology Industries Development, genetic sequencing, big data and other technologies are encouraged to be used to achieve precision medicine, prevention, diagnosis and treatment in cancer, hereditary diseases and other diseases.

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Entry Barriers

We believe the following are the major entry barriers for China’s diagnostic outsourcing service market.

- **Technology.** The development of ICLs requires sufficient research investment and operation experience. New technologies, including novel gene sequencing platform, automated lab system and better logistics system evolve rapidly and enjoy wider application in the ICL industry. As a result, new ICL market participants may encounter difficulties in developing diagnostics technology, cold-chain logistics, operation system and other technologies.
- **Relationship with medical institutions.** Cooperation with medical institutions are vital. It is difficult for new ICLs to establish new client relationships with medical institutions. Medical institutions normally do not change ICLs during their ordinary course of business because of the high switching cost given the need for short turnaround time, strict quality control and the amount of time, money and effort needed to customize testing services.
- **Talent recruiting.** ICLs require professional and experienced team for both research and operation. New ICLs may face difficulties in recruiting appropriate talents.

Future Trends

We believe China’s diagnostic outsourcing service market is expected to experience the following trends.

- **Technology advancement.** Advancement in technology has been affecting healthcare practices. For example, next generation DNA sequencing is more widely used in cancer research due to its advantages over traditional genomic analytic methods in terms of higher accuracy, speed, and precision as well as lower sample requirements. Moreover, emerging new mobile technologies, information technologies, automated laboratory systems, and ever advancing logistics capabilities have been changing the way that medical institutions deliver the healthcare services, and further boosting the growth of this market.
- **Increasing consolidation.** Large ICLs have a competitive advantage due to their large networks, extensive test offerings, and lower cost structures resulting from their scale effects. These advantages enable them to serve customers more effectively. In the future, small ICL companies without competitive advantages are likely to be phased out and the industry will become more concentrated.

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DIAGNOSTIC TESTING SERVICES FOR MEDICAL INSTITUTION ALLIANCES MARKET IN CHINA

Overview

To address the limitation in diagnostic outsourcing services, in recent years many hospitals tend to use a new service model to build up their diagnostic capacities within the medical institution alliances. Under the new model, the medical institution and the medical operation service provider will collaborate and establish an on-site diagnostic center at the medical institution and they will work together to manage the daily operation of this center. To facilitate diagnostic testing in these diagnostic centers, the service provider will also provide various technical supports to assist their diagnostic testing operations. Therefore, medical institutions have the opportunity to efficiently and timely perform diagnostic tests on site. Further, given that the technical supports provided by the service provider, such as provision of testing equipment and technicians, are crucial for the operation of the on-site diagnostic centers, medical institutions tend not to terminate their collaboration with the service providers. In the meantime, the collaboration also creates opportunities for the service providers' nearby ICLs to provide other diagnostic testing services for these medical institutions if the centers are not capable of providing them as per the service agreements.

Since 2017, as part of the healthcare reform, the PRC government has established a series of policies to support the local integration of China's healthcare system in the context of HDTs. Under the HDTs, patients with common and chronic diseases are encouraged to seek treatment in primary medical institutions, while patients with critical conditions or complex diseases that are beyond the ability of primary medical institutions should be treated in secondary or tertiary medical institutions. Further, first diagnosis shall be primarily performed at primary medical institutions and an efficient referral system will direct patients to the most suitable medical institution for treatment. Medical institution alliances refer to regional healthcare systems consisting of primary, secondary and tertiary medical institutions, under which medical resources can be shared efficiently, aiming to improve the service quality of primary medical institutions, promote the optimal allocation of medical resources, allocate patients to the appropriate hospitals depending on their medical conditions, and balance the uneven distribution of medical resources and diagnosis demands in China. In particular, medical institutions are encouraged to strengthen regional medical resources sharing by setting up diagnostic centers to provide same quality services for themselves, and promote mutual recognition of diagnostic results. Primary medical institutions can then easily direct patients to secondary or tertiary medical institutions within the same medical institution alliance. As such, medical institution alliances can help the HDTs improve its overall medical service capacity. In recent years, the PRC government has promulgated a series of regulations to promote the development of medical institution alliances, including the *Guidance on Promoting Medical Institution Alliances in China* (關於推進醫療聯合體建設和發展的指導意見) issued by the State Council in April 2017 and the *Interim Measures on Medical Institution Alliance Management* (醫療聯合體管理辦法(試行)) issued by the National Health Commission of the PRC on July 2020 (“Measures”). Pursuant to the Measures, medical institutions are encouraged to join medical institution alliances to enhance the HDTs in China.

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A medical institution alliance normally consists of a lead hospital (being a Class II/III hospital) and several member hospitals that need supports or resources from the lead hospital. Under the medical institution alliances, most patients shall first visit lower-tiered medical institutions for diagnosis and shall only be directed to higher-tiered hospitals within the medical institution alliances if the lower-tiered medical institution is not capable of treatment. By way of the collaboration among different tiers of medical institutions and to promote the optimal allocation of medical resources, patients with common and chronic diseases are encouraged to seek treatment in primary medical institutions, while patients with critical conditions or complex diseases that are beyond the ability of primary medical institutions should be treated in secondary or tertiary medical institutions, which then also have the potential to improve their efficiency. However, this collaborative process calls for market demand for standardized and professional diagnostic testing capabilities as most member hospitals currently lack such expertise or experience. Traditionally, different medical institutions have to engage different ICLs to perform diagnostic tests and the testing results may vary due to different diagnostic capabilities of different ICLs, which creates significant risks in HDTS. In order to address this, a diagnostic center will be established at the lead hospital on-site and member hospitals may use such a center by delivering their test samples to it. It is much more efficient for the lead hospital to engage a provider of diagnostic testing services for medical institution alliances to establish an on-site diagnostic center that can benefit the whole alliance. Further, in order to better serve medical institution alliances, key services are needed, including but not limited to building up diagnostic centers, professional medical expertise, diagnostic quality and technical standardization, information sharing, supply-chain management and pharmaceutical cold chain logistics. In view of the continuous policy support for medical institution alliances, establishing on-site diagnostic centers has become an effective solution to the pain points of current healthcare service market in China, and corresponding diagnostic testing services for medical institution alliances are expected to develop rapidly as well.

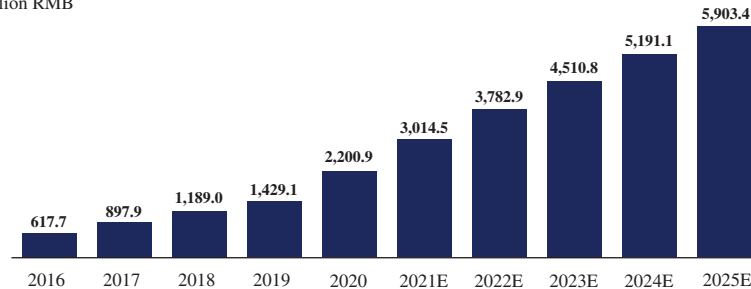
With the introduction of favorable policies (including the Guidance on Promoting Medical Institution Alliances in China by the State Council in April 2017, the Implementation Methods to Advance Covid-19 Nucleic Acid Tests issued by the Disease Protection Bureau of China Center for Disease Control in June 2020; the Interim Measures on Medical Institution Alliance Management issued by NHC in July 2020; and Notice on Continuous Improvement in the Management of Clinical Use of Antimicrobial Drugs issued by National Health Commission in July 2020) and the growing awareness of healthcare among the population, the total market size of diagnostic testing services for medical institution alliances in China shows an increasing trend. In 2020, the market size of diagnostic testing services for medical institution alliances in China was RMB2,200.9 million, compared to a market size of RMB617.7 million in 2016, showing a CAGR of 37.4% from 2016 to 2020. The market size is expected to grow up to RMB5,903.4 million in 2025, representing a CAGR of 21.8% from 2020 to 2025.

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Diagnostic Testing Services for Medical Institution Alliances Market in China, 2016-2025E

Period	CAGR
2016-2020	37.4%
2020-2025E	21.8%

By Service Revenue
Million RMB



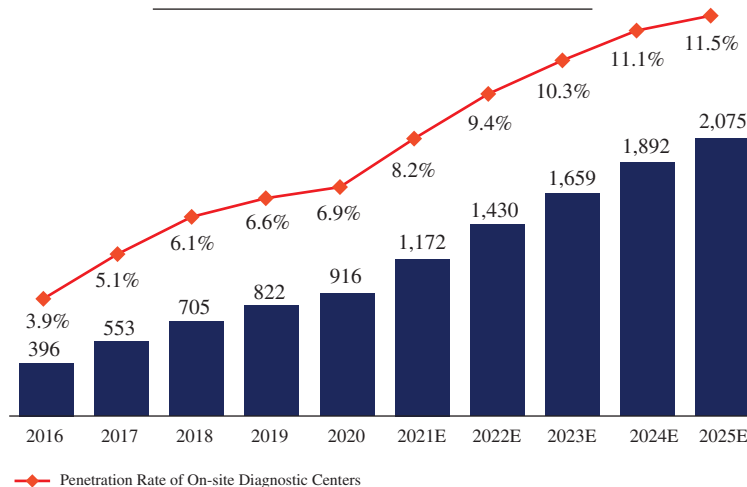
Note: Market size only includes medical testing service income.

Source: Annual reports, Company Website, China Health Statistic Yearbook, Expert Interviews, National Bureau of Statistics of China, Frost & Sullivan Analysis

As of December 31, 2020, there were 916 on-site diagnostic centers established and under contract to be established, increasing from 396 as of December 31, 2016 at a CAGR of 23.3%. The cumulative number of on-site diagnostic centers is expected to reach 2,075 by 2025, representing a CAGR of 17.8% from 2020. Substantially all of these diagnostic centers will be located in developed areas with high population density in China, such as Southern China, Eastern China and Central China. The penetration rate of on-site diagnostic centers in China is expected to increase from 6.9% in 2020 to 11.5% in 2025 in Class III and II hospitals.

Cumulative Number of On-site Diagnostic Centers, 2016-2025E

Period	CAGR
2016-2020	23.3%
2020-2025E	17.8%



Note: Number of on-site diagnostic centers only includes those that have entered into collaboration agreements with third-party medical operation service providers and that generate medical testing service income. It also only includes the on-site diagnostic centers in Class III and II hospitals.

Source: Annual reports of the listed companies, expert interviews, Frost & Sullivan Analysis

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Key Drivers

The growth of China’s diagnostic testing services for medical institution alliances market is expected to be driven by the following factors.

- ***Expansion of China’s healthcare service market.*** China’s healthcare service market has witnessed continuous and robust growth. The total size of the healthcare services market, as measured by total revenues generated by all types of healthcare institutions, has increased at a CAGR of 10.1% from RMB3,316.6 billion in 2016 to RMB4,869.0 billion in 2020, and is expected to further grow at a CAGR of 9.1% and reach RMB7,519.6 billion by 2025.
- ***Uneven distribution of medical resources.*** Medical resources in China are concentrated in class III hospitals. In 2020, Class III hospitals accounted only for 8.0% of the total number of hospitals in China, while receiving 54.2% of the total outpatient visits. The severe concentration of medical resources and diagnosis demand have caused poor patient experiences. Under the HDTs, primary medical institutions will take more responsibility in medical institution alliances. Due to a lack of emergency response capacity, incomplete drugs and equipment, and a shortage of specialist physicians, primary medical institutions will need diagnostic testing related supports to improve their overall capability to meet patients’ medical demands.
- ***Increasing outpatient visits.*** Outpatient visits has grown at a CAGR of 0.4% from 2016-2020. The total number of outpatient visits in China reached 3,323 million in 2020. Due to the high outpatient visit number in hospitals, there is a significant demand for ICLs and on-site diagnostic centers, thereby generating large revenue and potentially higher profitability for ICLs.

Entry Barriers

We believe the following are the major entry barriers for China’s diagnostic testing services for medical institution alliances market.

- ***Sufficient and Professional Support.*** The development of diagnostic testing services for medical institution alliances market in China requires sufficient investment. Service providers in this market need provide various technical supports, such as provision of testing equipment and technicians, to assist the medical institution to establish its diagnostic capacities. It is challenging for new entrants to assist in establishing an on-site diagnostic center in a short time.

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- ***Relationship with medical institutions.*** It is difficult for new ICLs to establish new client relationships with medical institutions. Medical institutions normally do not change ICLs during their ordinary course of business because of the high switching cost given the need for short turnaround time, strict quality control and the amount of time, money and effort needed to customize testing services.

Future Trends

We believe China’s diagnostic testing services for medical institution alliances market is expected to experience the following trends.

- ***Demand for diagnostic capacities in primary hospitals.*** Under an efficient HDTS, primary hospitals play an increasingly important role in dealing with common and chronic diseases, which will present significant demands for medical services, and will need to build up their diagnostic capacity in these hospitals. As such, it is expected that the diagnostic capacities at these hospitals will further enhance in the future.
- ***Increasing number of on-site diagnostic centers.*** As medical institution alliances are still at their early stages in China, currently only a few companies can provide technical supports required for diagnostic centers. As of December 31, 2020, there were 916 on-site diagnostic centers established and under contract to be established, increasing from 396 as of December 31, 2016 at a CAGR of 23.3%. The cumulative number of on-site diagnostic centers is expected to reach 2,075 by 2025, representing a CAGR of 17.8% from 2020. The penetration rate of on-site diagnostic centers in China is expected to increase from 6.9% in 2020 to 11.5% in 2025 in Class III and II hospitals. It is expected that with the growing number of on-site diagnostic centers, there will be more market players to provide such services and existing leading companies in this market will benefit the most from their first-mover advantages.

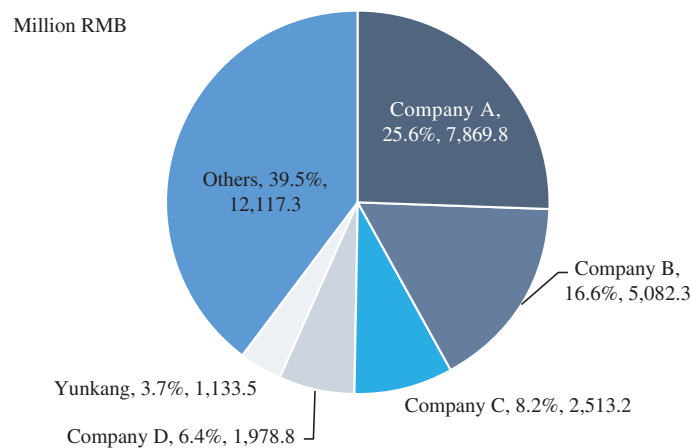
INDUSTRY OVERVIEW

COMPETITIVE LANDSCAPE

Our Ranking

The medical operation service market in China is very fragmented. In 2020, Yunkang had a market share of 3.7% in China’s medical operation service market in terms of revenue. The following chart illustrates the major medical operation service providers in China in terms of revenue in 2020.

**Major Medical Operation Service Companies
in China by Revenue, 2020**



Source: Annual reports, Company Website, Expert interview, Frost & Sullivan Analysis

Starting from 2020, COVID-19 tests have contributed to a significant portion of China’s medical operation service market. Yunkang had a revenue of RMB525.9 million from COVID-19 tests from diagnostic outsourcing services and diagnostic testing services for medical institution alliances in 2020. The following table illustrates the top market players for COVID-19 tests and non-COVID-19 tests in China’s medical operation service market.

Company	2020 COVID-19 Test Revenue/Million RMB*	2020 Non-COVID-19 Test Revenue/Million RMB*
Company A	2,666.8	5,203.0
Company B	2,091.8	2,990.5
Company C	924.5	1,588.7
Company D	422.2	1,556.6
Yunkang	525.9	607.6

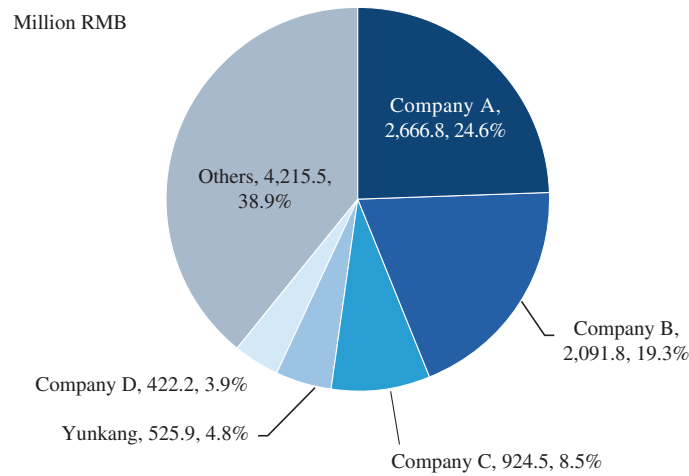
Note:

* It does not take into account diagnostic testing services for non-medical institutions such as financial institutions and insurance companies.

INDUSTRY OVERVIEW

The following chart illustrates the market size and market share of these medical operation service providers for COVID-19 tests.

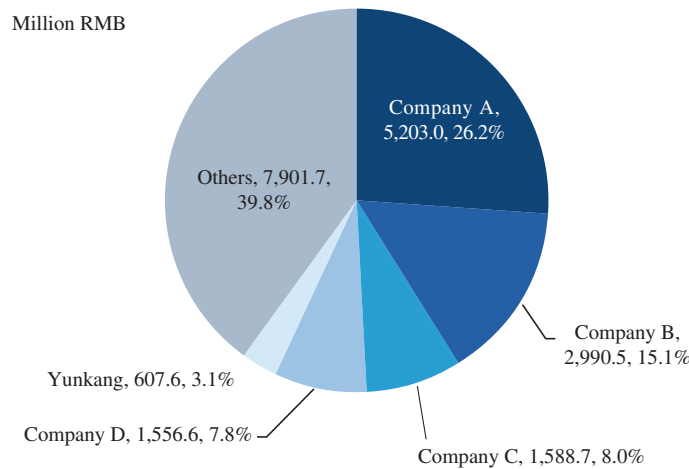
Breakdown of China Medical Operation COVID-19 testing Service Market, 2020



Source: Frost & Sullivan Analysis

The following chart illustrates the market size and market share of these medical operation service providers for non-COVID-19 tests.

Breakdown of China Medical Operation Service Market without COVID-19 Testing, 2020

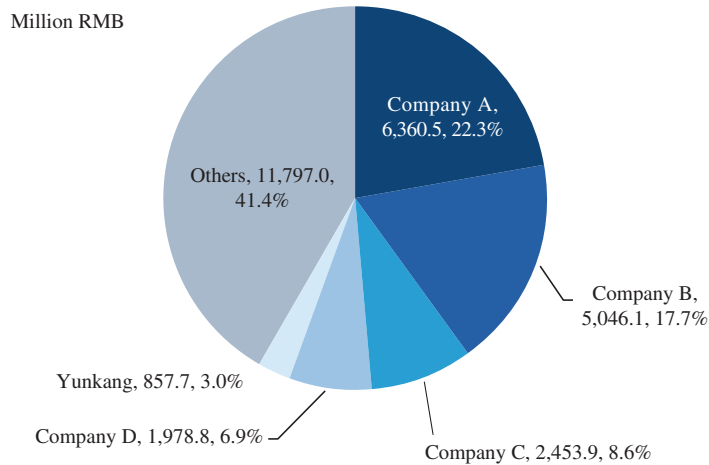


Source: Frost & Sullivan Analysis

INDUSTRY OVERVIEW

In 2020, there were over 800 market players in China’s diagnostic outsourcing service market, among which Yunkang had a market share of 3.0% in terms of revenue. The five largest market players in China’s diagnostic outsourcing service market accounted for approximately 60% of the entire market in terms of revenue in 2020. The following chart illustrates the major market players in China’s diagnostic outsourcing service market.

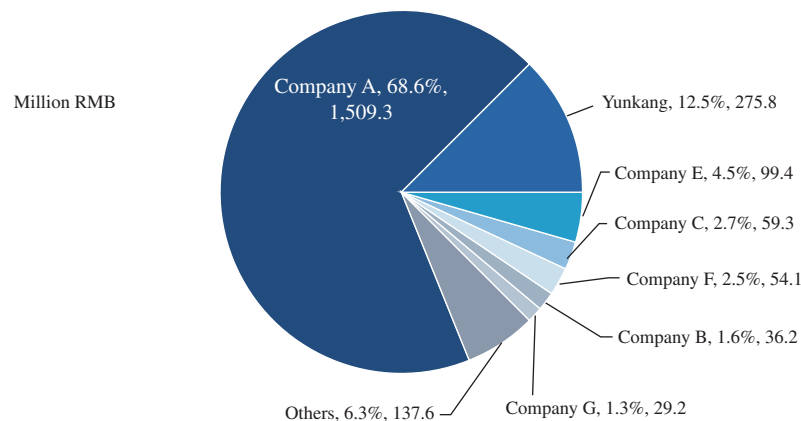
Providers of Diagnostic Outsourcing Services in China by Revenue, 2020



Source: Annual reports, Company Website, Expert interview, Frost & Sullivan Analysis

The diagnostic testing services for medical institution alliances market is highly concentrated, with the seven largest market players accounting for a market share of approximately 93.7% and the largest market player accounting for a market share of approximately 68.6%, in terms of revenue in 2020. In 2020, Yunkang had a market share of 12.5% in China’s diagnostic testing services for medical institution alliances market in terms of revenue. The following chart sets forth major market players in China in the diagnostic testing services for medical institution alliances market.

Providers of Diagnostic Testing Services for Medical Institution Alliances in China by Revenue^(Note), 2020



Note: The market size here only takes into account the medical testing service income.

Source: Annual reports, Company Website, Expert interviews, Frost & Sullivan Analysis

INDUSTRY OVERVIEW

The details of these competitors are set forth as follows.

Company	Background
Company A	Headquartered in Guangzhou and founded in 2003, Company A is a diagnostic testing service provider with over 35 ICLs in China. Company A is an independent clinical laboratory service company specializing in third-party diagnostic testing and pathological diagnosis. Its main business is to provide outsourcing services to various medical institutions. Company A is listed on the Shanghai Stock Exchange.
Company B	Headquartered in Hangzhou and founded in 2001, Company B is a diagnostic testing service provider with over 35 ICLs in China. Company B’s main business covers diagnostic testing services, R&D of diagnostic technology, production and marketing of diagnostic products, contract research organization (“CRO”), health management, and so on. Company B is listed on the Shenzhen Stock Exchange.
Company C	Headquartered in Hangzhou and founded in 2004, Company C is a diagnostic testing service provider with over 25 ICLs in China. Company C’s main business covers diagnostic testing services, research service, health management, pathology consultation service, and so on.
Company D	Headquartered in Shenzhen and founded in 1999, Company D is a diagnostic testing service provider with over 20 ICLs in China. Company D’s main business is to provide scientific research services and integrated solutions for precision medicine testing to scientific research institutes, corporates, medical institutions, and social health organizations. Company D is listed on the Shenzhen Stock Exchange.
Company E	Headquartered in Shanghai and founded in 2008, Company E is a diagnostic testing service provider with over 10 ICLs in China. Company E’s main business is to provide diagnostic services such as screening, early diagnosis, accurate classification, sensitive drug screening, efficacy monitoring and prognosis judgment for tumors, women and children, cardiovascular, infection and other common diseases for domestic and foreign medical institutions, enterprises and individuals.

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<u>Company</u>	<u>Background</u>
Company F	Headquartered in Wuhan and founded in 2003, Company F is a diagnostic service provider with over five ICLs in China. Company F’s main business is to provide esoteric testing services for medical institutions. Company F is listed on the Stock Exchange.
Company G	Headquartered in Chaozhou and founded in 2003, Company G is a diagnostic service provider with over 20 ICLs in China. Company G’s main business is to provide diagnostic testing services and nucleic acid molecular diagnostic products for medical institutions. Company G is listed on the Shenzhen Stock Exchange.

COST STRUCTURE

Yunkang’s major cost component is diagnostic equipment and reagents. According to Frost & Sullivan, the unit prices of reagents have been continuously decreasing since 2017. For example, the purchase prices of reagents for luminescent diagnostics, biochemical diagnostics, molecular diagnostics, microbiological diagnostics, and immunodiagnostics have been reduced by an average of 15% for the five years from 2017 to 2020. In addition, the average market price of immunofixation electrophoresis reagent, which is widely used in hematology testing, decreased from approximately RMB79 per unit in 2017 to RMB72 per unit in 2020. Another example is tuberculosis specific T-cell detection kit/interferon gamma release assay (TB-IGRA), a reagent that is widely used in infectious disease testing, the average market price of which decreased from approximately RMB146 per unit in 2017 to RMB96 per unit in 2020. The prices of major diagnostic reagents are expected to gradually decrease in the future. With respect to diagnostic equipment and reagents for COVID-19 tests, in 2021, the average market prices have experienced slight decrease primarily due to the increasing number of qualified suppliers, but their prices are expected to remain relatively stable in the foreseeable future.