

Analysis of the development of PCR testing industry in China

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Abstract: PCR testing, a highly accurate test, was the predominant testing method during the outbreak. With the outbreak of the Covid-19 outbreak, the PCR testing industry quickly became popular and ushered in breakneck profits. In response to the spread of the Covid-19 epidemic and the mutation of the virus, China has taken strong control. PCR testing plays a critical role in the fight against the epidemic. Because of its use of PCR, nucleic acid sequencing, and molecular hybridization, it is the most effective way to determine whether or not a virus has been contracted. In the past two years, the number and frequency of PCR tests have continued to grow, and the market size has exceeded 10 billion yuan. This paper will explain the basic situation of the PCR testing industry, and then analyze the business model of three listed companies and the financial statements data they provided. Then, this paper will predict and identify the risks the PCR testing industry face and propose constructive and feasible countermeasures and suggestions. Finally, this paper will initiate a discussion to predict the future development of this industry from an economic perspective.

1. Introduction

Data released by China's National Health and Wellness Commission shows that 9,214 million PCR tests have been performed until 2022. By the end of March 2022, 12,500 medical and health institutions were conducting PCR testing in China, about 2,400 medical testing-related institutions, and 144,700 technicians engaged in PCR testing. Among them, 60.67% of medical testing-related institutions have a registered capital of more than 10 million. Among these nearly 2,400 medical testing institutions, nearly 40% of them were established within 3 years [1]. And now, the government has started to implement the practice of mass testing, ordering the implementation of regular PCR testing in cities of 10 million people, and establishing a 15-minute walking PCR testing spot circle. This also brings a new round of business opportunities to the PCR testing industry [2, 3]. Unlike other countries, the Chinese government has adopted an extremely strict "dynamic zero" policy, so the demand for PCR testing has remained high for 3 years. The PCR testing industry has risen against the trend, becoming one of the few industries where performance and stock prices have flown in the context of the Covid-19 epidemic. The over-expansion and profiteering of the PCR testing industry have also brought about problems such as lax regulation and immature development. It brought a lot of instability and risk to this industry and market. With further policy macro-control, PCR testing industry and the emergence of overcapacity, single inspection price reduction, the expansion of the scale of testing, the slow return account period, and the expansion of the staff size, etc, therefore, China's PCR testing industry is facing a lot of uncertainty in the future.

2. Business Model Analysis of PCR Testing Industry

2.1. Market size

According to the statistics, China's PCR testing market size in 2019 is 10.6-billion-yuan, accounting for 18% of the global market size; the growth rate of China's PCR test market in the past three years is 18%-19%, 2021 China's PCR testing industry size rose to 13.2 billion yuan, and the market size is expected to further grow to 14.6 billion yuan in 2022[3].

2.2. Market price

The initial PCR testing pricing in 2020 was once as high as 200 yuan per person, companies such as BGI Group, Shanghai ZJ Bio-Tech Co, Sansure Biotech etc. have entered the market. Take BGI Group as an example, in 2018 before the outbreak, BGI Group achieved an operating income of 2.536 billion yuan, increased 21.04% year-on-year; it achieved a net profit attributable to shareholders of listed companies of 387 million yuan, decreased 2.88% compared with the same period of the previous year. However, by 2020, BGI Group's revenue reached 8.397 billion yuan, increased 199.86% year-on-year; and realized a net profit attributable to shareholders of the listed companies of 2.09 billion yuan, increased 656.43% year-on-year.

In 2021, BGI Group's revenue was 6.766 billion yuan, decreased 19.42% year-on-year, and net profit was 1.462 billion yuan, decreased 30.08% year-on-year. For the decline in performance, BGI Group also mentioned that it was mainly affected by the increased competition in the market of PCR testing business and the decline in the unit price of global PCR kit test.

On the other hand, the government is also making efforts to control prices. According to the "Notice on Reducing the Price and Cost of Coronavirus testing Tests" of the National Health Insurance Bureau in April this year, the government guideline price of PCR testing in public medical institutions was lowered again, and the single test for a single person was reduced to no more than 28 yuan per person, and the mixed test for multiple people was uniformly reduced to no more than 8 yuan per person [3, 4].

2.3. Earnings

According to the financial data of these three years, the three listed testing companies with the highest average revenue are Dian Diagnostics Group, Guangzhou Kingmed, and Daan Gene.

The revenue of Dian Diagnostics Group in the first quarter of 2022 reached 4.65 billion, increased 52.1 percent year-on-year, and net profit reached 750 million, increased 122.6 percent year-on-year. Excluding the revenue of the PCR testing business, the revenue of diagnostic services was only 968 million yuan, and the year-on-year growth rate was only 20.6%, which means that 1.88 billion yuan of revenue came from the PCR testing business revenue, which shows the promotion of the PCR testing on its earnings [5].

Guangzhou Kingmed's 2022 quarterly revenue reached 4.251 billion yuan, increased 58.7% year-on-year, and a net profit of 850 million yuan, increased 62.4%. For the year of 2021, Guangzhou Kingmed's total revenue was 11.94 billion and its net profit was 2.22 billion yuan. Among them, the revenue from third-party medical diagnostic services was 11.3 billion, which supported almost all of the company's revenue [5].

Daan Gene's 2022 quarterly report shows that revenue for the quarter was 3.362 billion and net profit was 1.68 billion, while Daan Gene's 2021 annual report shows that for the year 2021, its revenue was 7.664 billion yuan, increased 43.5% year-on-year, and net profit was 3.618 billion yuan, increased 47.7% year-on-year. Among them, the sales of coronavirus test kits brought 4.894 billion in revenue, an increase of 64.5% year-on-year [5].

3. Industry Chain Analysis of PCR Testing Industry

There are three business models in the PCR testing industry.

Research, development, and sales of testing reagents: Companies use research and development of PCR testing reagents as their core business, and earn revenue by selling reagents to hospitals, third-party medical testing centers, medical checkups, disease prevention centers, blood stations, and other medical institutions. Currently, most domestic companies adopt this business model, which has a relatively low technical threshold and low R&D investment but does not easily form a competitive barrier.

R&D and sales of testing reagents + R&D and sales of testing equipment: The business of the company includes R&D and sales of testing reagents and R&D and sales of testing equipment (including testing instruments and corresponding software analysis systems), creating an integrated

solution service provider of "testing instruments + analysis software + testing reagents". This model involves the research and development of diagnostic instruments, including PCR testing extraction instruments and PCR testing amplification instruments, which require high technical requirements and correspondingly high R&D investment, but because of its high technical threshold, it is easy for companies to build technical barriers. For example, Cepheid's GeneXpert series has long dominated the PCR testing equipment market.

Research and development of testing reagents or testing equipment + third-party medical testing center services: The company's core business is the research and development of PCR testing reagents or testing equipment, and while selling reagents or equipment to medical institutions, it also sets up a third-party independent medical testing center to provide PCR testing services. Although this model has a low technical threshold, it requires strong market operation capability and capital strength to provide quality medical testing services with a third party [6].

4. PCR Testing Industry Risk Prediction

4.1. Increased state regulation

For cost saving and illegal profit making in the accounting testing industry, the state has strengthened the supervision of the whole chain of PCR testing. The Beijing Municipal People's Procuratorate investigated and punished three medical testing laboratories in Beijing on June 6 and July 5, 2022, respectively, for allegedly obstructing the prevention and control of infectious diseases. Human irregularities are the main reason for this violation of the law by three nucleic acid testing institutions in Beijing. In addition to the investigation and punishment of companies, the state has also put forward higher standards for major companies and enterprises [7, 8].

4.2. Single test price reduction

In April 2020, Hubei took the lead in launching the new coronavirus test kit collection, the lowest winning bid was 16.78 yuan and the highest was 24.99 yuan. Up to now, 30 provinces have issued documents to reduce the government guidance price. On May 1, 2022, Henan mixed test project price again down from 8 yuan to 4 yuan; on May 2, Beijing also issued a notice to reduce the price of PCR testing, from 5.9 yuan to 3.4 yuan, temporarily the lowest in the country. The average production cost of nucleic acid kits is between 3 yuan and 5 yuan per copy. It can be seen that the gross profit of PCR testing is now close to zero [2].

On May 25, 2022, the Office of the National Health Insurance Bureau, the State Council to respond to the coronavirus epidemic joint prevention and control mechanism medical treatment group issued a "notice on further reducing the price of coronavirus testing and antigen testing", requiring localities to June 10, the coronavirus test single person single test reduced to no more than 16 yuan per sample, multiple people mixed test reduced to no more than 5 yuan per sample. For large-scale screening and regular testing organized by the government, the multi-person mixed test for Covid-19 is billed at a rate of no more than 3.5 yuan per person [5].

In the case of PCR testing profit margins continue to be compressed, with the intensification of industry competition and product prices down, some companies have even begun to see a decline in profits. For example, Maccura Biotechnology Co's 2022 first quarter report data shows that the company's operating income is 9.25 billion yuan, decreased 13.5% year-on-year. BGI Group reported in the first quarter of 2022 that the company achieved an operating income of 1.43 billion yuan in the first quarter, decreased 8.52% year-on-year. Shanghai ZJ Bio-Tech Co disclosed its first quarterly report for 2022, with a TTM of 275 million yuan, decreased 12.9% year-on-year [5].

4.3. Risk of increased market competition

PCR testing services are usually paid for by the government, and the purchasers of the projects are mostly state agencies, institutions, and group organizations for bidding. Under the pressure of competition, companies also change their routines and start to make efforts to sell at thin margins.

Along with China's PCR test market demand continuing to grow rapidly, many foreign companies

joined the competition, the industry competition is becoming increasingly fierce. In 2020, the international advanced enterprises Thermo Fisher, Kaji, Bao Biological, and BioRad combined to occupy more than 40% of the market share. In terms of technology level, the international advanced enterprises were established earlier and have accumulated decades of industry experience. Through a long period of R&D investment and technology accumulation, they have competitive advantages in terms of technology level and product line richness and have formed a high-quality brand image. In addition, on March 11 of this year, to further optimize the PCR testing strategy, the National Health Commission issued the "Application Program of Covid-19 Antigen Testing (Trial)", and antigen testing began to be implemented in China. With the gradual and effective control of the new crown epidemic and the launch of similar products or other related products such as vaccines by other companies in the industry, the sales of the company's PCR testing kits and related biological reagents will decline and profit margins will be reduced, which will harm the company's operating results. Some of these moves will make the local PCR testing industry has been affected [2].

5. Feasibility Suggestions

5.1. Increase routine testing

Since there are many asymptomatic infected people in this Covid-19 outbreak, and such people will not choose to actively seek medical treatment, so the routine testing will also be centered on screening asymptomatic infected people. Therefore, with the strengthening of health awareness among the population, the frequency of medical checkups will increase significantly, and PCR testing will be integrated into people's lives and become an indispensable part of the future, which will increase the supply of PCR testing services.

5.2. Technical capacity enhancement

In order to have a better competition with foreign companies, domestic companies can enhance equipment development, raw material self-sufficiency, and product localization to earn more market share. Also, the domestic companies could try to open foreign markets through lower prices.

Adding new tests: The field of nucleic acid testing has been constantly developing and looking for new clinical indicators to see, new gene loci, and pathogenic microbial testing is gradually being incorporated into the PCR testing category, which will bring new market increment, such as tumor concomitant diagnosis, tumor early screening, genetic disease screening, rapid screening of infectious diseases [6].

5.3. Increases antigen testing business

Currently, antigen testing opens up a new market, and due to its low cost and ease of operation, antigens have replaced most PCR tests abroad in 2021. According to a research report by China Pacific Securities, with reference to overseas issuance policies, the domestic market for new crown antigen self-test kits is expected to reach 17.7 billion - 26.6 billion yuan in a single month. It is expected that the demand for Covid-19 antigen testing products is expected to further increase. According to this calculation, the market size in a year is expected to exceed 100 billion yuan. However, the principle of antigen testing determines its sensitivity is not comparable to nucleic acid testing, especially under the current "dynamic clearance" policy, so major companies can take this business as a supplement to PCR testing. In addition, because the Covid-19 antigen detection technology barriers are not high, so with the acceleration of domestic antigen detection products approved, the number of companies approved for domestic listing will gradually increase, and the future competition between companies in the industry will become more intense. In this process, some of the originals have a firm position in the overseas market, leading sales, higher visibility, and supply capacity of the company have a first-mover advantage, which will further benefit. In the future, especially in cities with high input risk will carry out regular nucleic acid testing, and the demand for testing for Covid-19 will continue [3].

5.4. Artificial intelligence model

In response to the high cost of labor, companies can consider using robots to replace real people for some simple tasks. It is reported that Shanghai and other places have started to use robots for PCR testing [6].

6. Future Development Based on Economic Influence

According to the Figure 1 and Figure 2, the number of third-party laboratories in this industry is distributed more in first tier and second-tier cities, so the volume of testing in large cities will be more, and the number of positive releases will be more.



Figure 1 The PCR testing spots distribution in Beijing and Shanghai.



Figure 2 The PCR testing spots distribution in Shigatse and Turpan.

However, as the number of positives increases, blocking and quarantine policies will become more stringent. The boom in this industry will have a significant impact on other industries. More and more businesses are laying off workers and closing, and people are being forced to turn on online telecommuting. And one of the hard-hit industries, restaurants, saw a 22.7 percent year-over-year decline in revenue through April 2022, the largest drop since May 2020[9]. The economic losses from this non-direct impact are enormous, so the PCR testing industry is bound not to be able to coexist with other industries that are more, and this situation will also predict that the nucleic acid testing industry will hardly be able to grow in being treated as a blue ocean field.

7. Conclusion

As things stand, the scale of both PCR tests and antigen tests have been getting bigger and the price are getting cheaper, and the question of whether there will be a bubble in this industry lies mainly in the ability of companies to be forward-looking and far-sighted. If the epidemic recedes and the company has little other business to develop, there is naturally no prospect. The high profit model of relying on a single product is no longer viable, and companies need to open more businesses to help them get more profits. At the same time, this industry has seriously affected the development of other such as dining and logistics industries. Therefore, in order to have a stable development in the future, PCR testing must be adjusted into a normal state, and pandemic control and prevention measures must neither take the “one-size-fits-all” nor “change-as-you-go” approach. They must be effective with no mandatory long-time isolation.

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