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Feature Article

Chinese Outsourcing Nears Full Service

Integrated Service Is on the Horizon Due to Multinational CROs and Consolidation of Firms

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The Chinese outsourcing industry is playing an increasingly important role in today's global pharmaceutical arena. The capabilities of this industry are limited at present, and no China-based service providers are currently able to provide totally integrated service. This situation is due to change soon as a result of the consolidation between domestic companies and the entrance of an increasing number of multinational service providers.

Although a late starter, China's outsourcing industry is catching up quickly; it is currently experiencing explosive growth. The country has become one of the primary destinations for companies looking to outsource APIs. In addition to the constant emergence of new service providers, an increasing number of traditional pharmaceutical companies and R&D-oriented biotech companies are being approached by Western companies for partnering. Also, an abundance of multinational service providers have entered this market and are bringing in the Western service standard.

Despite fast development, the majority of Chinese service providers are still limited in their capabilities. At present, there is not a single service provider that is able to provide fully integrated services covering all areas of drug discovery, development, and manufacturing.

Classification of Providers



PPD expanded its global central lab services into China in 2008 through an exclusive agreement with Peking Union Lawke Biomedical Development.

At present, three large groups of companies make up the Chinese pharmaceutical outsourcing industry. Each group plays a different role in the value chain.

The first group includes traditional Chinese pharmaceutical companies that historically were only engaged in manufacturing and marketing of APIs and off-patented pharmaceuticals for the domestic market. However, Western companies are increasingly approaching these

traditional pharma companies for manufacturing of APIs or pharma intermediates.

Among this group are several major Chinese pharma companies that were originally owned by the state and presently provide large-scale manufacturing of APIs or formulated drugs under cGMP conditions. Examples include Shanghai Pharmaceutical Group and Harbin Pharmaceutical Group. Shijiazhuang Pharmaceutical Group, another example, recently formed a joint venture with Unigene to build a new facility in the Shijiazhuang economic and technology development zone.

In addition, many Chinese API manufacturers have also become targets for partnership or acquisition by Western companies. For instance, Hisyn Pharmaceutical was recently acquired by Hovione, and Chiral Medicine Chemicals was bought by Actavis.

The second group of outsourcing providers or potential partnership targets are R&D-oriented biotech companies. An increasing number of these companies have emerged in recent years. Many of them have been recognized by Western pharma/ biotech companies for their capabilities in drug R&D and/or manufacturing of biologics. Shanghai Sunway Biotech, one of the fastest growing biotech companies in China, is an example.

The third group is composed of young outsourcing firms. This segment of the industry is growing much faster than the other segments, which is significant as Chinese CROs didn't exist before 2000. Today there are more than 200 CROs in China that provide a variety of services to pharma and biotech companies, about half of them were founded by expat scientists and technicians who received advanced education and training in the West.

While new service providers continue to emerge, the older ones have grown exponentially, both in size and service capabilities. Five years ago [WuXi PharmaTech](#) employed less than 300 scientists, today it possesses a scientific staff of more than 3,000. Similarly, [ChemPartner](#), another Shanghai-based CRO, is hiring more than 1,200 scientists. Both companies recently added preclinical research services to their original chemistry-focused service scope.

In addition to emerging Chinese-founded service providers, an increasing number of Western entrepreneur-founded service providers has emerged recently. Both [Bio Duro](#) and [Chemizon](#) were founded by American entrepreneurs and are based in Beijing.

Service Capabilities

The large number of outsourcing firms in China has increased the options available to pharma/biotech companies, however, at present none of these service providers address the entire drug discovery, development, and manufacturing process. The entire Chinese pharma service industry, as a whole, can provide a full scope of services though. Table 1 lists the distribution of service providers in each technical sector of the drug R&D and manufacturing process.

Early-Stage Drug Discovery: China is a hot spot for pharma/biotech companies looking for large compound libraries that possess the structural features of drug-like molecules. This is mainly because the country has a huge pool of skilled synthetic organic chemists. Companies specializing in the synthesis of specialty chemicals, scaffolds and building blocks, as well as isolation and purification of natural products from traditional Chinese medicines, are spread all over the country.

Many rare chemicals that are hard to source are also available in China. In addition, many chemicals that are not profitable to make in other places are available in China at reasonable prices. Currently, more than 30 service providers possess focused compound libraries of various sizes.

Chinese service providers don't just provide focused compound libraries. Their service capabilities cover all areas of early-stage drug discovery. There are more than 15 companies providing services related to target identification and validation such as DNA sequencing, elucidation of protein structures, and reconstruction of proteins. In addition, there are more than 25 CROs performing medicinal chemistry-related research such as lead discovery and optimization, assay and assay method development, and pharmacological property study such as determination of PK and PD.

Many of these firms boast advanced techniques and experience such as high-throughput screening, computer-aided drug discovery, and structure-activity relationship expertise.

ADME/Tox Studies and Preclinical Research: There is a large group of China-based companies providing preclinical research including: in vivo efficacy testing, in vivo/in vitro ADME screening, plasma protein binding studies, metabolite profiling, and toxicity studies. The rapid proliferation of services in this segment is largely the result of the appearance of multinational CROs, lured by a favorable regulatory environment as well as readily available manpower resources at low cost.

Several CROs currently offering services in China are actually the service divisions,

branches, or subsidiaries of Western-based CROs, e.g., [CrimsonPharma](#), [Bridge Laboratories](#), and [Crown Biosciences](#).

Clinical Research: Contract clinical research has been conducted in China for more than a decade. In addition to a vast patient pool, China also has many specialized hospitals that have concentrated medical facilities, specialists, and knowledge in specific disease areas.

Pharma companies have also realized that China has a wealth of well-trained hospital physicians, thanks in large part to training provided by Western firms. The majority of these medical resources are located in major Chinese cities.

So far, most of clinical trials conducted in China are performed by major pharma companies or multinational CROs. Quintiles, PPD, and Covance have clinical trial centers in China, as do AstraZeneca, Pfizer, GlaxoSmithKline, and Sanofi-Aventis. In recent years, however, an increasing number of Chinese-founded CROs have started to emerge. At present there are a total of 14 CROs offering services in this sector.

Contract Manufacturing: Among all the sectors in the Chinese outsourcing industry, contract manufacturing is the most active. Service capability in this sector has greatly improved in recent years as evidenced by the shift of focus from the manufacturing of pharma intermediates to the manufacturing of APIs.

Many Chinese pharma companies also provide contract manufacturing services, typically on a seasonal basis when spare production capacity is available. At present there are about 60 contract manufacturing providers in China. The majority of them have expertise in chemical process research and development as well as advanced pilot plants for step-by-step process scale up.

API production facilities in Chinese CMOs are also generally supported by a QC/QA laboratory equipped with advanced analytical instruments. Many of them have production capacities that range from multikilograms to low-end metric tons (with reactor volumes ranging from 50 L to 3,000 L), and are able to handle a variety of chemical transformations. Technologies for some special chemistry tasks such as large-scale chiral resolution are also available.

Geographic Distribution

China-based service providers at present are located in and around Shanghai and Beijing, due mainly to their proximity to international airports. These two cities contain more than 60% of China's outsourcing providers. Shanghai is home to many CROs providing chemistry-related services and CMOs, whereas Beijing is populated with CROs providing biology-related services such as preclinical and clinical research. Table 2 lists the geographic distribution of China-based pharma outsourcing providers.

Major Limitations

Largely due to its short history, the capability of the Chinese pharma outsourcing industry is quite segmented at this time. No single company is able to provide a full scope of services covering all technical areas of R&D and manufacturing.

As a result, companies that wish to outsource projects must break them into fragments and separately outsource the pieces to several vendors. Even though many China-based service providers have the ability to develop robust and scalable chemical processes for any complex compounds, their strong service capabilities are eclipsed by the fact that they can't provide additional services such as manufacturing of APIs under FDA or EMEA-certified cGMP conditions.

Today, many Western pharma/biotech companies, in particular the small- to medium-sized ones, prefer integrated service from a CRO or a CMO. They expect the service provider to not only be able to develop a robust production process, but also to manufacture the API on a large enough scale to support drug candidates in preclinical and/or clinical development.

Future Development

The Chinese pharma outsourcing industry has become a major force. Although, at present, not many China-based service providers are in the position to make acquisitions or mergers abroad, having a business operation closer to customers is a model many Chinese service providers are considering.

As more experience is accumulated, it is likely that the service capabilities of many China-based service providers will be enhanced. In addition to vertical growth, more consolidations will occur in the near future, which will go a long way toward providing integrated services.

In the not so distant future, Chinese companies will expand their services to include biology- and molecular biology-related areas. These service providers will be rewarded by small-sized pharma/biotech companies that prefer one-stop shopping. In addition, small but well-established China-based CROs/CMOs will further strengthen their service capabilities by developing new technologies in niche areas, thus becoming favored partners for large pharma or biotech companies.

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