

## **The Future Development of The Global Pharma Outsourcing Industry after the Financial Crisis**

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It has been widely accepted that the rarely encountered financial crisis has dramatically changed the landscape of the global biotech industry. Whereas those major pharma companies are also using this opportunity to address the existing issues within their own organizations. As a result, new operation models are likely going to evolve within both industries. Outsourcing service providers, both CROs and CMOs, have to get prepared to face the changes.

### **Challenges facing global drug companies**

Most major pharma companies have been running at low R&D productivity for a number of years. For instance, Merck already realized that in recent years more than 75% of its R&D investment failed to yield any products. The increasing difficulty to discover a new drug is one factor to blame. The gradually raised regulatory bar due to the safety concern is another factor. What is worse, these factors are currently coupled with the escalating operation cost within every company and the vigorous control of healthcare spending by the government of almost all countries. Meanwhile, to many of those R&D-focused small biotech companies, the significant shrinkage of the availability of venture capitals caused by the financial crisis has become the major threat to their continual operation.

All in all, the key issues to all drug companies both at present and in near future are how to speed up their R&D progress while still able to maintain the overall operation budget. To those major pharma and biopharma companies that have products on market, the extra challenge is how to expand their market territories while still able to maintain their R&D focuses so as to have a steady growth performance for their revenues. However, no matter which type of drug companies, the essential part of these challenges is the work efficiency and productivity.

### **New strategies pharma and biotech industries will likely implement in near future**

Needless to say, to address these issues, all pharma and biotech companies are going to take a series of actions. To improve R&D productivity, on one hand, they are going to

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restructure their R&D divisions into smaller organizations. For example, Pfizer is planning to reorganize its R&D divisions into numerous smaller R&D centers, each focusing on only one therapeutic area and containing 100-150 researchers. On the other hand, they are going to increasingly implement the new R&D model of the Networked Partnership (NP). For example, Eli Lilly has set up an independent operation group in its Indianapolis headquarters, called Chorus, specifically focusing on handling all collaborations with its partners worldwide. It also has a similar operation group in its Shanghai R&D center, though much smaller in size.

To speed up their R&D progress, pharma will also increase in-licensing of drug candidates from any drug companies around the world. For example, Sanofi-Aventis is in plan to reduce its efforts and R&D spending in early stage research. It will only focus on late stage development and registration.

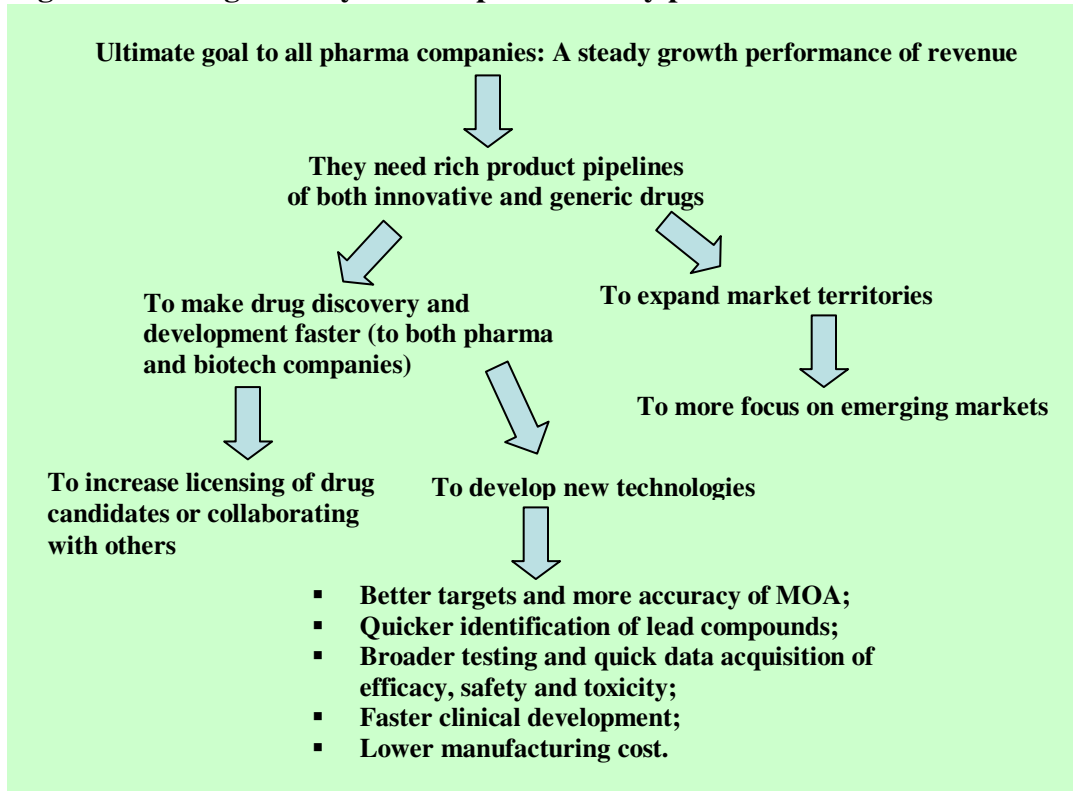
To expand market territories, they are going to focus on those emerging markets. For example, recently several major pharma companies including Pfizer and Novartis licensed sales rights to numerous generic drugs from generic drug makers (including Indian generic drug companies) and will market them in Asia, East Europe, South America and Africa.

### **How will pharma outsourcing industry likely be affected?**

In the value chain of the series of changes, outsourcing service sector is, unfortunately, in the downstream. How the future global pharma outsourcing industry will likely develop is entirely dependent upon the actions taken by both pharma and biotech industries to address the existing issues within their own area. Figure 1 depicted a series of strategies that will be likely implemented by both pharma and biotech industries.

To major pharma companies, their ultimate goal is to have a stable revenue growth every year. To achieve that, they need a steady flow of drug products in their product pipelines and gradual expansion of their market space. To have a product pipelines filled with innovative drugs, pharma companies need to focus on improving productivity so as to make drug discovery and development faster. To speed up that progress, they will have to enhance collaborations with as many companies or organizations and on as many aspects of a drug R&D program as possible. Simultaneously, they will also have to look around all over the world to in-license appropriate drug candidates.

To speed up their drug R&D progress, both major pharma and small biotech companies need to have more accurate therapeutic targets and know better about the mechanism of action (MOA) of a drug compound. They also need to quickly identify lead compounds and get them optimized more rapidly. In addition, they also need quicker results of efficacy and safety testing as well as clinical trials. All these operations must be organized in an efficient way. Besides, they also need to address the manufacturing cost for both developmental and marketed drugs.

**Figure 1. Strategies likely to be implemented by pharma and biotech industries**

To realize their goals, all drug companies are going to conduct broader and more extensive research on genomics and proteomics including the development of disease/animal models, more effective diagnostic and imaging methods and better biomarkers. They will also need large size, readily available compound libraries that possess special structural features so that they can be screened whenever needed against the selected targets. Besides, they will also rely on faster, more accurate high-throughput screening systems to screen these compound libraries. A big portion of such heavy research work will be fulfilled in the manner of collaborations with either academic research institutions (for target identification/validation and elucidation of action mechanism) or professional service providers (for discovery, development and manufacturing). On the other hand, they will also likely want to have more control themselves over the late stage development as well as drug registration.

Based on these analyses, we reached following conclusions with regards to how outsourcing demands by both pharma and biotech industries will likely change in the near future.

**a. Outsourcing demands by major pharma companies will likely still remain strong in following areas:**

- Research in genomics and proteomics: Major pharma companies are in desperate need to develop better drugs with high success rates. To meet that end, they must have more accurate therapeutic targets, understand better about the MOA and the causes of side effects. To accomplish these tasks, they need to increase their focus on the basic research in genomics and proteomics.
- Compound libraries with special structural features: To improve their efficiency, pharma companies need a large number of compound libraries readily available for screening. Ideally, these compound libraries are designed and constructed according to the structural information of the active sites of the well validated targets. So outsourcing of large, structurally diverse, more natural product-like compound libraries will still remain strong. Wider R&D collaborations between drug companies and those technically capable professional CROs are expected.
- Preclinical research: Major pharma companies have realized that many special techniques such as the good animal/disease models, better *in vivo* bio-imaging techniques, more effective molecular diagnostic tools have been developed in recent years. Moreover, in these areas they have been already left far behind. As such, major pharma will more rely on those companies possessing the specialty techniques to fulfill their tasks. In fact, in the future more specialty biotech companies will become outsourcing service providers.
- Manufacturing: All pharma companies will still outsource a large portion of manufacturing work for both developmental and approved drugs including generics. They may only keep a couple of key steps in house, such as those chemical transformations requiring special techniques.

**b. Outsourcing demands by major pharma will likely become weak in the following areas:**

- Rational drug design and optimization of lead compounds: As drug discovery and potency optimization are considered the core part of drug R&D (they are also highly IP-sensitive), the major pharma will likely still keep most part of this type of research in house.
- Late stage (such as phase III) clinical trials: As this stage is so critical in the lengthy process of drug R&D, many major pharma companies will still want to have more control. Plus, they have super-strength and expertise in this area including the drug registration.
- Formulations: As this is the tech-rich stage in a drug manufacturing process and also the last stage directly related to the product quality, very likely most part of this type of work will be kept in house by these major pharma companies.

**c. New outsourcing strategies likely to be implemented by major pharma in selecting their service partners:**

Major pharma companies will become more careful and pickier when selecting ideal outsourcing service partners in the future. They will more prefer those major CROs/CMOs that are well equipped and capable of conducting a wide range of drug R&D and/or manufacturing work. Meanwhile, they will also look for those CROs/CMOs that possess specialty techniques such as the quick and effective detections of toxicity, bio-imaging, new drug delivery, etc. On the other hand, to more effectively control cost, they will still outsource to low cost regions but, with the same reasons, will prefer choosing those technically capable CROs/CMOs.

**d. Outsourcing demands by those R&D-focused small biotech companies will likely still remain strong in the following areas:**

- Late stage clinical trials (phase IIb and after);
- Large scale cGMP production of APIs to support the late stage clinical trials;
- Development of special techniques such as drug delivery, biomarkers, diagnostics/bio-imaging, etc.

**e. Outsourcing demands by these small biotech companies will become weak in the following areas:**

Mainly due to the dramatic change in the landscape of the global biotech industry by the financial crisis, in near future there will be significantly fewer biotech startups, fewer early stage companies and fewer early stage drug R&D programs. Therefore, in the following couple of years a significant reduction in outsourcing demand by the biotech sector will likely occur in such areas as drug discovery, small scale production (such as kilo lab work) and early stage development including preclinical and phase I clinical trials.

**What should outsourcing service providers do to face these challenges?**

As more and more major pharma companies are going to scale down their organization and as more and more biotech companies become virtual or semi-virtual, gradually more core part of drug R&D will be outsourced in the future. This requires CROs possess either strong service capabilities spanning a wider range of the drug R&D and manufacturing process, or special techniques that can help speed up any part of an R&D project. The former will become favored outsourcing partners and thus are able to secure large, long-term projects that may include milestones and royalties. The latter will become favored specialists of the industry to solve special technical difficulties.

Following are only two examples to illustrate the importance of special techniques urgently needed by the entire pharma industry:

- New techniques to detect, identify and even able to reduce toxicity of a drug compound. At present >50% of drug candidates fail in clinical trial mainly because of their severe toxicity or side effects.
- New, effective drug delivery techniques. The other high failure rate of clinical trials is ascribed to the low *in vivo* efficacy of testing drugs largely due to the fact that these drug molecules can't reach the target because they are either intercepted by the body enzymes in their delivery path or early extruded without entering the cells. An ideal delivery tool will certainly enhance the success rate. Also, new delivery techniques are highly desirable to biologic drugs as all of them are large molecule drugs which render extreme difficulty for their effective delivery. At present, the only delivery vehicle for biologic drugs is injection, which is not favorable to patients. New delivery techniques that can make the administration of biologic drugs easier are thus also highly desired.

In summary, due to the fact that the outsourcing service is in the downstream of the value chain and that the dramatic changes will likely occur to the entire pharma industry, all outsourcing service providers have to get them prepared to face these changes. The key to be success in the new wave of outsourcing is to have a broader service scope, better service capability and quality, special techniques in any part of drug R&D and manufacturing, and the advantage of cost effectiveness.