High Level International Business Symposium

Framework Conditions for Innovation in China:

Biotechnology and Pharmaceutical Industry

Xiaolin Zhang, PhD
Innovation Center China
AstraZeneca Global R&D

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China: Similar Health Problems to the West

Living longer

Obesity/Allergy

Smoking addiction

Stress/Pain

- How to provide health care to its aging population is one of the biggest challenges for all governments
- This is especially true for developing countries like China because of "getting old before getting rich"
- Innovation to invent better and cheaper drugs and provide better access are critical

Uniqueness in China

- China is an attractive place for direct investment from multi-national pharmaceutical companies
- Unlikely electronic and communication industry, biopharmaceutical related export is minimal, and decreasing!
- This largely reflects the low R&D intensity in China by both domestic and foreign companies:
  - High R&D investment needed: 17 to 22% of sales in MNC in west vs. 0.8 to 2 % in China
  - Cost for a new drug to market: ~1.2 billion US dollar.
  - Long investing time for return: ~ 10 to 15 years to put a drug to market
- The situation is changing. MNC is moving genuine R&D activities to China
- Pharmaceutical industry is critical for meeting medical needs.It is also a high tech and high return industry!

From “Made in China” to “Invented in China”

- The world biggest pharmaceutical companies are starting to invest in China for genuine R&D activities:
  - June 2006, AstraZeneca announced to invest US$100 million for the next 3 years in China to establish a R&D center, initially focusing on translational science for cancer research
  - August 2006, Norvatis announced similar plan with broader activities.
  - GKS is moving global CNS research to Shanghai
  - Sanofi-Aventis is expected to announce major investment in China soon
  - Roche has a chemistry based unit in Shanghai
  - Pflizer has a data center and discovery team in Shanghai
- Motivation and strategies are different, but all reflect the greater confidence in scientific capabilities and legal system

Innovation in China - Strength

- Good educational system. Large pool of well trained scientific work force
- Strong government policy: open-door, innovation
- Strengthened IP protection system
- Thanks to the open-door policies, large pool of west trained scientists
- Many of the returnees are coming back with significant science and management experience
- Good infrastructure
- Relatively aligned with the west in science, technology, and medical practice

Framework conditions

- Education
- Competition
- Corporate governance
- Financing innovation
- IP rights protection
- Technological standards
- Public procurement

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Framework conditions: Education

- Good educational system. Solid training in basic science, lab technician levels.
- Training in applied science/technology disciplines not sufficient:
  - Strong in synthetic/organic chemistry, but few in medicinal chemistry
- Training in independent research capabilities not sufficient:
  - Earlier exposure to research
  - Quality in postgraduate level research training
- Research interests and skills seem narrow
  - Cross-discipline training
  - Favorable career path: few physician scientists in China
- Overall, talents for team leader and above are in short supply

Framework conditions: Competition

- Tend to be at the low tech level and cost cutting:
  - API synthesis
  - India experience: from generic to genuine
- Because of weak domestic pharmaceutical industry, some of the fundamental supporting capabilities are lacking:
  - Animal models and testing
  - DMPK testing
  - GLP/GCP compliant testing labs
- Few are operating at the global standards. This is critical as data will be submitted for supporting regulatory approval

Framework conditions: financing innovation

- Lack a single national level funding system for biopharmaceutical research
  - Lack of national competition
  - Small repeated funding for the same or similar projects
  - Lack of national/regional level coordination common in the US
- Funding selection process can be further enhanced. Peer review system needs further enforcement
- Right balance between “basic” and “applied”

Framework conditions: IP protection

- Significant improvement
- Right balance: what is patentable and what is defendable
- Confidentiality a bigger concern
- Can have significant impact on R&D investment decision
  - Recent Norvatis dispute in India

Framework conditions: Technological standards

- Technological standards could be in the form of regulatory guidelines and policies
- Global and regional standards should be adopted
- Deviation and discrepancies are major concerns for Multi National Companies:
  - Data consistency
  - Data acceptance across countries
- China specific practice may erode China strength