Open Innovation in the Pharmaceutical Industry: The Case of Novartis

By

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* The views expressed are those of the author and do not necessarily reflect the views of UNCTAD.
Open Innovation in the Pharmaceutical Industry: The Case of Novartis

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Agenda

- Novartis at a Glance
- Concept of Open Innovation
- R&D and Open Innovation at Novartis
- Open Innovation in Emerging Countries
- Policy Recommendations
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Novartis at a Glance

- World’s third largest pharmaceutical company by sales
- One of 20 largest companies by market capitalization
- Ranked among most respected companies worldwide
- Unique portfolio to meet changing healthcare needs:
  - Leading innovative pharmaceuticals
  - High-quality, low-cost generics
  - Preventive vaccines
  - Consumer health products
Novartis’ Key Facts

Sales by division¹ – 2007

<table>
<thead>
<tr>
<th>Division</th>
<th>Sales %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sandoz</td>
<td>19%</td>
</tr>
<tr>
<td>V&amp;D</td>
<td>4%</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>63%</td>
</tr>
<tr>
<td>Consumer Health</td>
<td>14%</td>
</tr>
</tbody>
</table>

Sales by region – 2007

<table>
<thead>
<tr>
<th>Region</th>
<th>Sales %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rest of the world</td>
<td>16%</td>
</tr>
<tr>
<td>Americas</td>
<td>42%</td>
</tr>
<tr>
<td>Europe</td>
<td>42%</td>
</tr>
</tbody>
</table>

¹ Excluding Consumer Health discontinued operations

Key facts

<table>
<thead>
<tr>
<th>Year</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td></td>
</tr>
<tr>
<td>Net sales:</td>
<td>39.8</td>
</tr>
<tr>
<td>Net income:</td>
<td></td>
</tr>
<tr>
<td>- continuing operations:</td>
<td>6.5</td>
</tr>
<tr>
<td>- total</td>
<td>12.0</td>
</tr>
<tr>
<td>R&amp;D:</td>
<td>6.4</td>
</tr>
</tbody>
</table>

2007

Employees: 98 200
Countries: 140
Headquarters: Basel, Switzerland

Ten leading countries:
- USA
- Spain
- Germany
- United Kingdom
- Japan
- Canada
- France
- Brazil
- Italy
- Turkey
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- **Concept of Open Innovation**
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Innovation Is Complex And Difficult To Measure

Product innovation, not just product invention

- Discovery of new innovative molecular entities
- Innovative collaboration models with Biotech
- Fast development in parallel processes
- Innovative drug delivery systems
- Rapid global market introduction and penetration
- Excellence in product commercialization
- Maximization of product life cycles
Innovation Terminology

„The innovator has for enemies all who have done well under the old law“  
Niccolò Machiavelli (1469-1527)

**Innovation**
Typically understood as the successful introduction of something new and useful

**Closed Innovation**
Refers to processes that use internal know-how and make little use of external knowledge

**Incremental Innovation**
Seeks to improve the systems or the products that already exist, making them better or faster or cheaper
The Concept of Open Innovation


Key recommendations:

- In a world of widely distributed knowledge, companies cannot afford to rely entirely on their own research.
- Companies should buy or license processes or inventions from other companies.
- Internal invention not being used should be taken outside the companies (e.g. Licensing, spin-offs)

Henry Chesbrough
Professor at the UC, Berkeley
Haas School of Business
Most Innovation Builds on a Body of Knowledge and Science

- Apple’s iPhone is “2007 best invention” Award winning
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R&D in the Pharmaceutical Industry

- **Identification:** 10,000-100,000 compounds, 12% probability, 2-4 years
- **Preclinical:** 6-8 compounds, 75% probability, 4-7 years
- **Clinical:** 1.5 compounds, 100% probability, 4-7 years
- **Market:** Phase of Introduction, >1.2 billion $, 2-4 years

*PoC* = Proof of Concept
Novartis Pharma and Corporate Research: Worldwide Community 2007

- Cambridge/Boston
  - Oncology
  - Metabolism/Diabetes
  - Cardiovascular Diseases
  - Infectious Diseases

- New Jersey
  - Oncology, Genome & Proteome Sciences

- UK
  - Respiratory Diseases
  - Gastrointestinal

- Basel
  - Nervous system
  - Transplantation
  - Oncology
  - Arthritis/Bone Metabolism
  - Functional Genomics

- La Jolla
  - GNF
  - Functional Genomics

- Siena
  - NVGH
  - Vaccines Institute

- Singapore
  - NITD
  - Tropical Diseases

>4000 Scientists
2007: >1.5 bio USD
Global Development Network Focused on Innovation

United States:
- East Hanover NJ: cross disease area capability
- Cambridge MA: biomarkers, translational medicine

UK:
- Respiratory

France:
- Analytical laboratories

Switzerland:
- Development headquarters
- Cross disease area capability

Japan:
- Cross-disease area capability

China:
- Oncology

India:
- IT capabilities
- Clinical trial execution
- Safety biostatistics (NICCI)

Total > 8000 Associates

+ 59 other countries worldwide
Open Innovation is Standard Practice at Novartis

- Open innovation is standard practice at Novartis

- The innovation strategy of strong internal R&D centers complemented by in-out licensing, targeted M&A and external collaborations increases the potential for innovation by sharing the risk of failure (sunk R&D costs)

- However, innovation calls for an appropriate framework
Significant External Collaborations

- Novartis spends **30% of its R&D budget** on external collaborations with 150 biotech companies and 300 academic centers
- Every external project is linked to a dedicated internal team

**Source:** Novartis International
Novartis R&D: > 450 Collaborations in 22 Countries

More than 150 collaborations with biotech companies
More than 300 collaborations with academic institutions
In-Out Licensing as Part of the Innovation Strategy

- Traditionally, Novartis’ focus was on own developments
  - From 20 top selling products 5 have been licensed
- Recently, Novartis put significant development efforts also in licensed products

- First innovative treatment for hypertension in over a decade
  (Breakthrough: First direct renin inhibitor)
- Only in the US, approximately 72 million patients with hypertension

Source: Haase et al. 2007 / Analysis Group / Novartis International
Targeted Mergers & Acquisitions as Part of the Innovation Strategy

- Focus on growth areas in healthcare

- Chiron Acquisition
  - Novartis enters strategically important vaccines business gaining access to novel blood-screening tools and strong market position

Source: Annual Report 2006 and 2007
Novartis Venture Fund – An Important Source of Innovation

- The Novartis Venture Fund is committed to investing in companies that develop innovative life science concepts for the benefit of patients.

- Since its foundation in 1996, worldwide more than 150 entrepreneurial ventures have been helped to finance.

- In 2007, a total investment of CHF 68 million was made.

Success Story: Sirtris Pharmaceuticals

Source: Activity Report Venture Fund 2007
Local Life Science Cluster in Basel, Alsace and Freiburg

- 4 life science global players are in a network with
  - academics (4 major universities, 30 life science institutes) and
  - about 400 SMEs (~1/3 founded since 1990)

- Key success factors are
  - the geographic uniqueness,
  - highly developed infrastructure and
  - the Novartis Venture Fund
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The number of researchers in China has increased tremendously from 695’000 in 2000 to 1.2 Mio in 2006.
Non-OECD economies account for a growing share of the world’s R&D.

In most of the non-OECD economies, the increase in R&D was well above the OECD average.

However, the total gross expenditure on R&D as percentage of GDP is still low.

*Source: OECD 2007*
Open Innovation in Emerging Countries

Potential

- Increasing supply of qualified labour supply in emerging countries
- Growing share of R&D investments in Non-OECD countries
- Developing and emerging countries catch up concerning patents and scientific publications
- Open Innovation strengthens access to knowhow and technologies and the „Ecosystem of Innovation“
- Industrial R&D expenditures and innovations are an important growth driver
- Companies gain from the higher proximity of the local researchers to the market
Open Innovation in Emerging Countries

Constraints

- Insufficient intellectual property rights (patentability, data protection, TRIPS agreement)
- R&D intensity is still relatively low in emerging countries
- Local infrastructure
- Political framework (e.g. taxes, human rights, labor legislation)
- Political stability
- Government policy transparency, Corruption & organized crime
- Bureaucratic, regulatory obstacles to business and administrative burden
- Ineffectiveness of policy & judiciary
Novartis R&D Institute in Shanghai

- Integrated biomedical R&D center as integral part of the Group’s global R&D network in Shanghai’s Zhangjiang Hi-Tech Park since May 2007.

- Under construction is a permanent 38’000 square meter facility for approximately 400 scientists (investment of USD 100 Mio).

- R&D focus on addressing urgent medical needs in China and the rest of Asia, particularly infectious causes of cancer endemic to the region (e.g. liver cancer).

- Expansion of the strong network of existing R&D alliances that Novartis has in China: Integrated exploratory development center that will closely collaborate with basic research and local academic centers.

- Focus not an cost savings, but on gaining access to the country’s vast talent pool and scientific promise.

- Local presence in a fast-growing environment.
Novartis Development Center in Changshu

- USD 83 million development and production plant for about 100 development associates opened 2007.

- The global innovation center for chemical drug development is the first such site outside Switzerland and the US.

- The Changshu site focuses on the process and analytical research and development of innovative experimental drug substances as well as their manufacturing technologies.
Novartis Development Center in Hyderabad

- The site of Novartis development operations in India has recently been moved to Hyderabad - a big city in the state of Andhra Pradesh.

- The Novartis Development center in Hyderabad has now grown to over 430 associates and provides services ranging from document writing, data management of clinical trials and statistical analysis to integrated medical safety.
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Policy Recommendations

- Attractive framework conditions for leading class scientific companies which aspire to invest (e.g. IP, tax system)

- Provide investment incentives comparable to other countries (e.g. Singapore)

- Protect and foster innovation (e.g. differentiated pricing, reimbursement, market access)

- Increase attractiveness of location for leading researchers (e.g. international schools, infrastructure)

- Build education portfolio with focus on competence fields (foster natural sciences)
Thank you!

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