About ITIF

- Independent, nonpartisan research and education institute focusing on intersection of technological innovation and public policy, including:
  - Innovation and competitiveness
  - IT and data
  - Telecommunications
  - Trade and globalization
  - Life sciences, agricultural biotech, and energy

- Mission to formulate and promote policy solutions that accelerate innovation and boost productivity

- Ranked by University of Pennsylvania as top science and technology think tank in United States and number two in world
Today’s Presentation

1. How Countries Can Best Maximize Innovation
2. How Mexico Can Get Key Innovation Policies Right
3. Turbocharging Life-Sciences Innovation in Mexico
Innovation Economics: The Race for Global Advantage

Rob Atkinson

Stephen Ezell

Yale University Press
September 2012
Get the “8 I’s” of Innovation Policy Right

1. Inspiration
2. Intention
3. Insight
4. Institutions
5. Investment
6. Incentives
7. Intellectual Property
8. International
Get the “Innovation Triangle” Right

Business Environment

Innovation/Technology Policy Environment

Regulatory Environment
Business Environment

1. High levels of entrepreneurship
2. Access to risk/venture capital
3. Embrace dynamic churn and change (e.g. creative destruction)
4. Cultural willingness to experiment and take risks
5. Strong management skills in enterprises
Regulatory Environment

1. Transparency and rule of law
2. Protection of intellectual property (and other property rights)
3. Ease of starting a business
4. Pro-competition regulatory policies
5. Flexible labor policies
Innovation/Technology Policy Environment

1. Funding for research, especially commercially oriented research

2. Incentives to invest in R&D, capital equipment, workforce training

3. Universities strong not just in liberal arts but engineering

4. Supporting technology transfer from academia to industry

5. Strong STEM education system
The Distinct Nature of Innovation-Based Industries

1. They compete by inventing *next-generation* products and services.

2. They embody and depend on intellectual property.

3. They are characterized by very high initial fixed costs (e.g., R&D/design), but low marginal costs...which

4. Means they need access to large global markets.
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How Does Mexico Rank on Global Innovation Indices?

**The Americas**

Overall
1. Finland
2. Sweden
3. United Kingdom

10. United States
25. Canada
40. Chile
41. Brazil
45. Colombia
46. Costa Rica
48. Peru
50. Mexico
56. Argentina
Key Innovation Priorities for Mexico

1. Increase investment in research and development.
2. Leverage tax policy to stimulate R&D and innovative activity.
3. Increase investment in education.
4. Continue to bolster and support entrepreneurship.
5. Strengthen IP rights.
6. Continue to embrace trade and FDI liberalization.
Increase Mexico’s National R&D Intensity

R&D Investment as a Share of GDP

Colombia | Uruguay | Mexico | Costa Rica | Argentina | South Africa | Latin America & Caribbean | India | Europe & Central Asia (excluding high income) | Brazil | East Asia & Pacific (excluding high income) | China | Singapore | United States | Korea

0.00% | 0.50% | 1.00% | 1.50% | 2.00% | 2.50% | 3.00% | 3.50% | 4.00% | 4.50%
Increase Government Funding of University Research

Source: ITIF, Contributors and Detractors: Ranking Countries’ Impact on Global Innovation, 2016
Increase Industry-Funded University Research

Average Industry Income Per Academic (US$ Thousands)

Source: THE DataPoints © THE data@timeshighereducation.com.
Effective Tax Policies Can Help Spur Mexican R&D

Comparative R&D Tax Credit Generosity

Source: We’re 27th! The United States Lags Far Behind in R&D Tax Credit Generosity
Effective Tax Policies Can Help Spur Mexican R&D

- Generous R&D tax credits (e.g., Brazil, China, India, Malaysia).
- Robust collaborative R&D tax credits (Chile, Thailand, Turkey).
- Patent boxes (China, Hungary).

Sources: ITIF, Creating a Collaborative R&D Tax Credit, ITIF, Patent Boxes: Innovation in Tax Policy and Tax Policy for Innovation
Invest More in Human Capital/Education

Average Education Expenditure for Primary and Secondary Student

Source: ITIF, Contributors and Detractors: Ranking Countries’ Impact on Global Innovation, 2016
Increase the Number of Science Graduates

![Bar chart showing science graduates per 1,000 citizens for various countries.](chart)

Source: ITIF, Contributors and Detractors: Ranking Countries’ Impact on Global Innovation, 2016

**Science Graduates per 1,000 Citizens**

- Malaysia
- Turkey
- Costa Rica
- Chile
- Brazil
- Colombia
- Mexico
- Argentina
- Indonesia
How Mexico Is Supporting Entrepreneurship

- Launched the National Entrepreneur Institute.

- Introduced a joint Entrepreneurship and Innovation Council to “strengthen the North-American high-impact entrepreneur ecosystem.”

- CONACYT University and Technology Transfer Centers Program.

- Universities increasingly embracing/teaching entrepreneurship.
Women Remain an Underutilized Innovation Resource

Total Early-Stage Entrepreneurial Activity, Select Countries

Encourage Entrepreneurship and Risk Taking

“Successful Entrepreneurship Enjoys A High Societal Status”

Latin American countries shown in orange.

Reform University Policies to Spur Innovation and Entrepreneurship

- Give academic researchers ownership rights of IP deriving from government-funded research (e.g., “Bayh-Dole”).
- Give students rights to the IP they invent at universities.
- Increase permeability. Take faculty members’ commercial experiences into account in tenure decisions; allow faculty to suspend tenure to pursue commercialization opportunities.
- Support the development of university incubators.
- Develop university entrepreneurship rankings.
IPRs Are Vital to Innovation, As They:

1. Create incentives for domestic innovation.
2. Enable a virtuous cycle of innovation.
3. Induce knowledge spillovers that help others to innovate.
4. Promote the international diffusion of technology, innovation, and knowhow.
5. Boost domestic levels of exports, R&D, and FDI.
Strengthen Intellectual Property Rights Protections

Source: U.S. Chamber of Commerce, International Intellectual Property Index

2017 GIPC International IP Index Rankings

Mexico 20th of 45 Countries
Leadership in Biotechnological Innovation Requires Robust IP Protection

Source: Global Intellectual Property Center, IP - A Global Navigation Center for the Knowledge Economy

Correlation = 0.77

Index 5th edition, life sciences-related indicators scores, standardized to 100
Mexico Leading the Charge for Trade Liberalization

Source: The Economist; Moody’s Analytics/Economy.com
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Why Life-Sciences Innovation Matters

- Helping citizens live longer, healthier lives generates economic benefits.
  - Improvement in U.S. life expectancy from 1970 to 1990 added $2.8 trillion to U.S. productivity.
  - This equaled $12,000 per U.S. citizen, per added year of life expectancy.
- Opportunity cost of missing work (especially for chronic diseases)
  - Keeps many out of work, lowers productivity, contributes to absenteeism.
- Eliminating heart disease valued at $48 trillion, curing cancer $47 trillion; Alzheimer’s disease will cost $1 trillion a year by 2050.
Mexico’s Robust Life-Sciences Sector

**Mexican pharmaceutical industry**

Mexico has the 2nd largest biopharmaceutical market in Latin America and the 11th largest in the world.

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Proportion of GDP</td>
<td>1.2%</td>
<td>Growth of 0.7% from 2007</td>
</tr>
<tr>
<td>Proportion of Manufacturing GDP</td>
<td>6.8%</td>
<td>Significant manufacturing sector in Mexico</td>
</tr>
<tr>
<td>Direct Jobs</td>
<td>86,277</td>
<td>37% linked to manufacturing</td>
</tr>
<tr>
<td>Indirect Jobs</td>
<td>313,605</td>
<td>Includes jobs in other companies from which the pharmaceutical industry buys goods or services</td>
</tr>
<tr>
<td>Sector growth</td>
<td>4.3%</td>
<td>Between 2007 and 2013</td>
</tr>
<tr>
<td>Economic units</td>
<td>718</td>
<td>Companies located mainly in Mexico City, Jalisco, Estado de México and Puebla.</td>
</tr>
<tr>
<td>Multinational biopharmaceutical industry</td>
<td>20 of 25</td>
<td>Top multinational biopharmaceutical companies operate in Mexico</td>
</tr>
<tr>
<td>Investment in R&amp;D</td>
<td>US$500m by 2025</td>
<td>Increase of US$160m from 2015</td>
</tr>
<tr>
<td>Biotechnology drugs</td>
<td>65% by 2030</td>
<td>Proportion of patent applications for new medicines</td>
</tr>
</tbody>
</table>

Sources: Mexican Health Review 2015, Marketline, INEGI, COFEPRIS, Denue and CANIFARMA. Courtesy Fundacion IDEA.
How Mexico’s Life-Sciences Sector Fares Globally

Source: The Race for Biopharmaceutical Innovation: BCI Survey 2016
Increasingly Fertile Environment for Life-Sciences Innovation


Source: WIPO, The Geneva Network
Increasingly Fertile Environment for Life-Sciences Innovation

Absolute Number of Clinical Trials to Date, Global Comparison 2016

Source: Clinicaltrials.gov, 2016 (Note: data is based on number of clinical trials registered in the database in January 2016)

Source: Pugatch Consilium, Developing the Biotechnology Sector
Life-Sciences Innovation Strengths in Mexico

- A cost-competitive environment for life-sciences innovation.

<table>
<thead>
<tr>
<th>Competitive costs (% of savings)</th>
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<tr>
<td>-35.9% R&amp;D in biotechnology</td>
</tr>
<tr>
<td>-31.5% Clinical trials</td>
</tr>
<tr>
<td>-39.3% Product testing</td>
</tr>
<tr>
<td>-14.4% Pharmaceutical manufacturing</td>
</tr>
</tbody>
</table>

- Increasingly skilled human capital base for biomedical research.

- Diverse ecology a platform for biomedical innovation.

Source: The Geneva Network, ProMexico
Addressing Roadblocks to Regulatory Approval of Innovative Medicines

- Speeding patient access to innovative drugs vital for sector to realize its true innovation potential.

- Only 10% of drugs are approved and made available in public healthcare institutions.

Source: The Geneva Network
Life-Sciences Innovation Opportunities for Mexico

- Improve clinical trial guidelines (e.g. research team changes means trials restarts; clarify ownership rules for clinical trial data).
- Greater enforcement of biopharmaceutical IP; fight piracy/counterfeiting.
- Enhance R&D collaboration between biopharmaceutical industry, research institutions, and universities.
- Public procurement system fragmented; prioritizes cost over value.
- Recognize that biopharmaceutical value creation comes from the R&D, not from the manufacturing.
- Set a goal of becoming a “G20” life-sciences innovator.
Muchas Gracias!

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